

VOLUME 13

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UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

Before The Honorable YVONNE GONZALEZ ROGERS, Judge

EPIC GAMES, INC.,)	
)	
Plaintiff,)	NO. C-20-5640 YGR
)	
vs.)	Wednesday, May 19, 2021
)	
APPLE, INC.,)	Oakland, California
)	
Defendant.)	BENCH TRIAL
)	
APPLE, INC.,)	
)	
Counterclaimant,)	
vs.)	
)	
EPIC GAMES, Inc.,)	
)	
Counter-Defendant.)	
)	

REPORTER'S TRANSCRIPT OF PROCEEDINGS

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TRANSCRIPT PRODUCED BY COMPUTER-AIDED TRANSCRIPTION

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1 Wednesday, May 19, 2021

8:00 a.m.

2 P R O C E E D I N G S

3 **THE CLERK:** Calling civil action 20-5640, Epic Games,
4 Inc. versus Apple, Inc.

5 And counsel, please state your appearances.

6 **MS. FORREST:** Good morning, Your Honor. Katherine
7 Forrest for Epic.

8 **THE COURT:** Good morning, Ms. Forrest.

9 **MS. MOSKOWITZ:** Good morning, Your Honor. Lauren
10 Moskowitz for Epic.

11 **THE COURT:** Yes, good morning, Ms. Moskowitz. Mr.
12 Even.

13 **MR. EVEN:** Good morning, Your Honor. Yonatan Even
14 for Epic.

15 **MR. CARVAJAL:** Good morning, Your Honor. Alex
16 Carvajal for Epic.

17 **THE COURT:** Good morning.

18 **MR. NIU:** Good morning, Your Honor. Jin Niu for
19 Epic.

20 **THE COURT:** Good morning.

21 Mr. Sweeney, good morning, sir.

22 Mr. Rudd, good morning.

23 **MR. RUDD:** Good morning.

24 **THE COURT:** All right. On the Apple side.

25 **MR. DOREN:** Good morning, Your Honor. Richard Doren

1 for Apple. And joining us this morning are Heather Grenier
2 and Stephanie Fine, in-house counsel at Apple.

3 **THE COURT:** Okay. So Stephanie, this is new, right?
4 Okay. And the last name again, please?

5 **MS. FINE:** Fine. F-I-N-E.

6 **THE COURT:** F-I-N-E. Okay, thank you. Good morning
7 and welcome.

8 **MR. SRINIVASAN:** Good morning, Your Honor. Jay
9 Srinivasan for Apple.

10 **THE COURT:** Good morning.

11 **MS. YANG:** Good morning, Your Honor. Betty Yang for
12 Apple.

13 **THE COURT:** Yang. Welcome back.

14 **MS. YANG:** Thank you, Your Honor.

15 **THE COURT:** Mr. Spalding.

16 **MR. SPALDING:** Good morning, Your Honor.

17 **THE COURT:** Good morning.

18 Then is that Ms. Adams I see back there?

19 **MS. ADAMS:** Good morning, yes.

20 **THE COURT:** Good morning.

21 And maybe Mr. Phillips.

22 **MR. PHILLIPS:** Yes, good morning, Your Honor.

23 **THE COURT:** Good morning.

24 Okay, the other two I'm not sure I recognize. Mr. Doren,
25 can you help me there?

1 **MR. DOREN:** Oh, I'm sorry.

2 Jennifer Rho, Your Honor. R-H-O.

3 **THE COURT:** And one other?

4 **MR. DOREN:** Oh, and Dana Li, L-I.

5 **THE COURT:** Okay, welcome.

6 And then I believe it looks like we have a few more
7 people.

8 So today is Wednesday.

9 Mr. Manfredi, good morning, welcome back.

10 And then from the press, we have same as yesterday. So
11 Mr. Cisco from the information. Good morning.

12 And Bobby Ellen from NPR. Good morning.

13 And then we have the witness.

14 And one other person in the courtroom.

15 **MS. BESHLIAN:** Good morning, Your Honor. Ana --

16 **THE COURT:** Ms. Forrest?

17 **MS. BESHLIAN:** -- Your Honor.

18 **THE COURT:** Is -- is she with Epic?

19 **MS. FORREST:** She is. She is one of our paralegals
20 handling the logistics, Your Honor.

21 **THE COURT:** And her name again, Ms. Forrest?

22 **MS. FORREST:** Anna Beshlian.

23 **THE COURT:** Okay. Welcome to the courtroom.

24 **MS. BESHLIAN:** Thank you.

25 **THE COURT:** Ms. Forrest, do we have any issues to

1 address this morning?

2 **MS. FORREST:** Not issues, Your Honor. Just sort of
3 two points of information.

4 One is -- or and a request, on the essential facilities
5 motion that Apple had made yesterday, we wanted to ask Your
6 Honor when we should respond so that Your Honor can consider a
7 written response. We plan to address it also orally on
8 Monday.

9 **THE COURT:** Right.

10 **MS. FORREST:** If Sunday works for Your Honor, we
11 could do it then. But we don't want to presume that that's a
12 good time for Your Honor. So we want to elicit what the
13 appropriate time would be.

14 **THE COURT:** Maybe -- maybe today is the proper day
15 to -- in light of that -- to let folks know and -- and in part
16 people listening who are not familiar with the legal process,
17 that you will not have an answer on Monday and you will not
18 have an answer on Tuesday. I believe Judge Koh's opinion in
19 the *Qualcomm* case was about 250 pages long. I will go through
20 on Monday how much evidence is in this case and how much
21 evidence has to be reviewed and considered by me. And I've
22 got a very tiny team helping me.

23 So Sunday is fine because there's just no way that I'm
24 going to rule automatically on it.

25 **MS. FORREST:** Would Sunday at 6:00 p.m. then, Your

1 Honor, be acceptable?

2 **THE COURT:** You know what, if you're going to do it
3 at 6:00 p.m., it doesn't matter when on Sunday you do it
4 because I won't look at it at 7:00.

5 **MS. FORREST:** Would earlier in the day on Sunday mean
6 that Your Honor would have a chance to consider it before
7 Monday? 'Cause we could do any time. I just -- I hesitate to
8 take up your Sunday but --

9 **THE COURT:** I've worked every weekend since we've
10 started.

11 I think the other thing people should know is that federal
12 judges have hundreds of cases. Our cases do not go away when
13 we're in trial. I explain to jurors when I tell them that we
14 end the trial day at 1:30 with -- we go from 8:00 to 1:30, two
15 15-minute breaks, and it's not because I like to take long
16 lunches. It's because I have hundreds of other cases to deal
17 with after we finish with our trial day. And this doesn't --
18 this isn't any different.

19 So I -- I think noon is probably better.

20 **MS. FORREST:** That works for us, Your Honor. Thank
21 you.

22 **THE COURT:** So I will look at it, I'll look at the
23 docket at noon on Sunday.

24 **MS. FORREST:** The only other issue was just a point
25 of information is that on the document PX1904 that was clawed

1 back on privilege grounds yesterday -- that word is not a --
2 just for the record, the word "clawback" is the word that's a
3 technical term of art in the legal community for taking back a
4 document in terms of privilege. So it's a perfectly
5 appropriate way for Apple to have done this.

6 Apple asserted privilege over the document, clawed it
7 back. We are briefing that currently in front of Judge
8 Hixson, and we are -- the parties are engaged in the typical
9 we've sent Apple our portion, they will then send us their
10 portion, but it's happening in realtime. We have now already
11 sent our portion to Apple.

12 **THE COURT:** Okay. And -- and yes, I agree with you.
13 That's a technical term in the legal community.

14 **MR. DOREN:** Your Honor, just two administrative
15 matters.

16 The first is on the timing of Mr. Cook's testimony.

17 **THE COURT:** Yes.

18 **MR. DOREN:** We are hoping and requesting that he be
19 permitted to testify at 8:15 on Friday. And if we -- we are
20 trying to bring everything in for a -- for a landing, to have
21 that be -- he be our last witness on Friday morning.

22 In the event for some reason, since we don't control
23 cross, if we haven't concluded by Thursday, we would still
24 like to start with Mr. Cook, and conversely if we finish a few
25 minutes early on Thursday, we would still request to start

1 with Mr. Cook at 8:15 on Friday.

2 **THE COURT:** Any objection?

3 **MS. FORREST:** We have no objection to that, Your
4 Honor.

5 Just so that the record is clear, we notified Apple this
6 morning that we may call, not will call, but we may call some
7 very short rebuttal witnesses. And that could occur then
8 after Mr. Cook's testimony.

9 **THE COURT:** Okay.

10 **MR. DOREN:** And then secondly, Your Honor, purely on
11 the housekeeping end of things, I've been asked to ask when we
12 can start removing materials. We thought the day would never
13 come. If we could do that work Friday afternoon, if it won't
14 inconvenience the Court. If it will, we would do it Monday.

15 **THE COURT:** I -- I think the best person to ask is
16 Ms. Stone. I don't know if her preference is for people to
17 slowly start taking it.

18 I've done numerous cases where we have lots of binders.
19 This kind of case might not be the case that I'd do it again
20 in this way. But you're -- I'm not going to them anymore. I
21 did initially, but I'm not anymore.

22 So you're welcome to take my set as long as you have
23 permission from Ms. Stone to access the courtroom.

24 **MR. DOREN:** Thank you, Your Honor. We will discuss
25 it with her.

1 **THE COURT:** Okay.

2 **MR. DOREN:** Thank you.

3 **MS. FORREST:** Thank you.

4 **THE COURT:** All right.

5 Hearing nothing else, let's go ahead and bring Mr. Schmid
6 back to the stand.

7 **THE COURT:** Good morning, sir.

8 **THE WITNESS:** Good morning, Your Honor.

9 **THE COURT:** You are still under oath. Do you
10 understand?

11 **THE WITNESS:** I do.

12 **THE COURT:** Mr. Srinivasan, you may begin.

13 **MR. SRINIVASAN:** Thank you, Your Honor.

14 Jay Srinivasan for Apple.

15 **DIRECT EXAMINATION (RESUMED)**

16 **BY MR. SRINIVASAN:**

17 **Q.** Mr. Schmid, you testified yesterday that you are head of
18 games business development for the App Store. Did I get that
19 right?

20 **A.** Correct.

21 **Q.** And in that capacity, how many game developers do you and
22 your team engage with?

23 **A.** We engage with hundreds of developers globally many times
24 a year. So often we'll meet with them weekly, sometimes
25 monthly, sometimes quarterly. And then there's, you know, the

1 occasional developer we'll only touch base with once every
2 year or so.

3 **Q.** Okay. And how about you personally, to what extent do you
4 engage with game developers?

5 **A.** Every -- every day of my life. So many of my friends
6 from, you know, before joining Apple are game developers, and
7 I've continued to foster those relationships as well as grow
8 many more relationships. So I talk to developers every day.

9 **Q.** Okay. And -- and what type of game developers do you
10 engage with?

11 **A.** I engage with developers of all sizes. So we have, you
12 know, the Activisions of the world, the EA's of the world, and
13 then game developers like Chain Reaction Games in Indiana
14 which are a father and son team that we met at WWDC a few
15 years back. Talk to them -- I'm sorry. We talk to them on a
16 monthly basis too. And, you know, we -- we try to focus our
17 energy in the places where we feel like we can do the most
18 good.

19 **Q.** And is there a -- a set list of game developers that your
20 team meets with that's a fixed group? Or is it some --
21 some -- somehow different in how you decide who to meet with?

22 **A.** The list is fairly fluid. There are certainly developers
23 we've been meeting with for many, many years that have never
24 left our list. But there's developers that kind of come and
25 go, again based on resources and what's driving the business

1 and what's popular on the App Store, et cetera.

2 **Q.** Okay. And you mentioned, I think, a global team. Do you
3 and does your group interact with developers all over the
4 world?

5 **A.** We do. And we have a global team of business managers
6 that we work very closely with to engage with developers in
7 all regions and get local expertise and bring those expertise
8 to developers in other regions and help them expand.

9 **Q.** And what are the subjects that you cover with developers
10 when you meet with them?

11 **A.** We cover everything from monetization to marketing, to
12 localization, to first-time user experience, to editorial
13 support, to app review, to engineering support in some cases.
14 So it's quite a wide list of cat -- or of subjects.

15 **Q.** Okay.

16 And you mentioned localization in that list. Can you
17 explain what localization is?

18 **A.** I'm sorry, yes. So localization is kind of what I
19 referenced moments ago which is we'll -- we'll help a
20 developer expand to a new market that they may not be in. In
21 order to do that, they have to localize and actually translate
22 the language in their game.

23 But we -- we actually prefer a term called culturalization
24 to take it a step further than just localization so we can
25 really have a developer more deeply engaged with that market.

1 Q. And do you personally play video games?

2 A. I do. Maybe too much.

3 Q. Well, I mean this sounds maybe like a silly question, but
4 can you estimate how many video games you've played over the
5 course of your career and life?

6 A. Do you want me to start in, like, 1992? I think that --

7 THE COURT: Is that when your life started?

8 THE WITNESS: No. No, Your Honor. My life started a
9 couple years before that.

10 But it took me to about five before I could start really
11 getting into games.

12 Thousands of games that -- and, yeah, of all ranges, all
13 sorts of categories of games.

14 BY MR. SRINIVASAN:

15 Q. Okay. And can you turn back to DX5552, which we looked at
16 yesterday? I think it was the only exhibit we looked at.

17 A. (Reviewing document.)

18 Q. Can you remind us again what DX5552 was?

19 A. This is the categories pages on the App Store microsite on
20 developer.apple.com.

21 Q. Okay. And do these categories include podcasts?

22 A. There is no podcast category. However, there are podcast
23 apps that could categorize themselves as news or
24 entertainment.

25 Q. And these are apps on the App Store?

1 **A.** Correct.

2 **Q.** And do these apps monetize, do you know?

3 **A.** Some do.

4 **Q.** Do you know how they do that?

5 **A.** Apps, for instance, Overcast will monetize with a premium
6 subscription that gives you some additional features. Some
7 other apps will monetize by unlocking content through an
8 in-app purchase or a subscription.

9 **Q.** Okay. And does Apple have a podcast app?

10 **A.** We do.

11 **Q.** Okay. And is that app in the App Store?

12 **A.** It comes directly on your phone when you purchase an
13 iPhone.

14 **Q.** And do you know if Apple currently monetizes its podcast
15 app?

16 **A.** They do not. They have not certainly since I've been
17 using podcasts since the original iPod. So podcasts actually
18 predates the App Store.

19 **Q.** Okay. And do you know if Apple has a plan to add to that
20 functionality?

21 **A.** They do. There is a -- a service called Podcast Plus that
22 will allow podcasters to monetize their podcast within the
23 podcast app.

24 **Q.** And that's -- is that currently available?

25 **A.** It is not.

1 Q. Okay. Back to this page DX5552, I just want to recap from
2 yesterday. I think you mentioned that the App Store has a
3 single tab for the games category and that everything else,
4 all of these other categories, are going to be under the apps
5 tab. Did I get that right?

6 A. Correct.

7 Q. And do you -- do you have an understanding of why that is?

8 A. Games are the biggest category in the App Store. And we
9 spend a lot of time and energy focused on, you know, games in
10 a very different way than we've focused on apps. That's why
11 we split the teams, both on editorial and the business side,
12 but also those industries are fairly discrete as well.

13 Q. When you say the industries are fairly discrete, what do
14 you mean by that?

15 A. So game developers are quite separate from app developers
16 in many circumstances. There are exceptions like big
17 organizations like Microsoft that, you know, have Microsoft
18 Office as well as, you know, Minecraft and other -- other
19 games.

20 But generally speaking, game developers are focused on
21 just developing games, and app developers are often focused on
22 a single app or a suite of apps.

23 Q. Okay.

24 Other than games developers generally not making nongame
25 apps, anything else that sets game developers apart from other

1 developers?

2 **A.** The technology so -- whoop, I'm so sorry.

3 The technology certainly sets them apart. So game
4 developers will often use Unreal Engine or Unity. And app
5 developers typically don't go that route. They don't use an
6 off-the-shelf engine like that.

7 But also game developers tend to be a little bit more on
8 the what we call the bleeding edge as far as graphics
9 processing and technology generally. I don't want to say
10 without caveat because there's certainly creative apps that
11 really push the limits of what graphics processing can do, but
12 game developers are certainly in a different category because
13 of that.

14 **Q.** Okay. And are game developers different in how they
15 monetize compared to other developers and app developers in
16 general?

17 **A.** Often, yes. So as I mentioned yesterday, there's in-app
18 purchase, and that's becoming a more frequent or more widely
19 used monetization path, a free app or game and then with
20 in-app purchase. There's certainly still a premium market of
21 games where there will be a larger purchase up front, but many
22 app developers now are really focused on subscription revenue
23 and growing a subscription business, whereas game developers
24 not as much.

25 **Q.** And I apologize if I covered this yesterday. But I

1 believe you -- is it the case that game developers are using
2 in-app currency as part of their game?

3 **A.** Correct.

4 **Q.** And is that use becoming --

5 **THE COURT:** Can you hold on just a minute.

6 I just received a note that our public line is not working
7 so let me stop the clock.

8 And sometimes -- I just want to say, the Court does not
9 control the telephone line. And sometimes something happens
10 in the ether and the line doesn't work. So let's just hold on
11 a minute and make sure we get the line reconnected.

12 (Pause in the proceedings.)

13 **THE COURT:** Okay. Do we have lawyers from LA?

14 Okay, raise your hand.

15 Okay. Warriors are on tonight.

16 (Off-the-record discussion.)

17 (Pause in the proceedings.)

18 **THE COURT:** Okay. It looks like -- I understand from
19 Ms. Stone that the line is up and running again.

20 Yes, Ms. Stone?

21 Let's see. Okay. I'm being told to wait.

22 (Discussion off the record.)

23 **MS. FORREST:** And, Your Honor, on the topic of what
24 might be different when the pandemic is over, I think it has
25 been eye-opening to see what can be done remotely in terms of

1 certain court proceedings that might not take a lot of time,
2 but my -- for, you know, counsel located all over the country,
3 otherwise have required lots of travel time. So it's been, I
4 think, an eye-opening experience in that regard as well to see
5 what can be done once we resume.

6 **THE COURT:** Yeah, I think so. I mean I -- you know,
7 I was never one to allow -- to allow many people to appear by
8 telephone because I am -- I actually learn a lot when engaging
9 in person with lawyers, whether, you know, a case -- my case
10 management conferences, as you all know, are very substantive.
11 I like to know what's going on. I try to understand kind of
12 the -- the whole purview of the cases.

13 And I just cannot -- I cannot -- I can't get the same kind
14 of information when I have people on a telephone line. Once
15 I've established a relationship with the lawyers, then
16 telephone lines are easier to do because you know each other.

17 I don't mind Zoom as much.

18 **MR. SRINIVASAN:** Yes.

19 **THE COURT:** So -- okay. So we have one -- okay. So
20 now, I --

21 (Off-the-record discussion.)

22 **THE COURT:** Let's make sure that time doesn't count
23 against counsel.

24 Looks like you can proceed now. Thank you.

25 **MR. SRINIVASAN:** Thank you, Your Honor.

1 Q. Mr. Schmid, do you have an understanding of why in-app
2 currencies have become more prevalent in game apps?

3 A. Yes. As I mentioned yesterday, it allows a developer to
4 maintain more control over an economy that goes across many
5 platforms. So I'll try to simplify it or explain it as simply
6 as possible, rather.

7 We have in game development or in free-to-play game
8 development sources --

9 (Clarification by the court reporter.)

10 **THE WITNESS:** Yes, I'm so sorry.

11 So in mobile game development, specifically free to play,
12 we have something called sources and syncs, the source being
13 that in-app currency that you purchase and the sync being
14 where you're spending that currency, so on an outfit or an
15 item in a game.

16 And that purchase, that in-app purchase is actually of
17 that source. So that source currency is what you're
18 purchasing. And that price can vary from region to region.
19 But what the developer prefers to do is stabilize the cost of
20 the item that you purchase using that in-app currency.

21 Did I explain that okay?

22 **BY MR. SRINIVASAN:**

23 Q. That made sense to me.

24 A. Okay.

25 Q. So if a user doesn't want to pay a commission, for

1 instance, on the App Store to Apple, is it possible to make an
2 in-app purchases of an in-game currency in a way to avoid
3 that?

4 **A.** Yes.

5 **MS. MOSKOWITZ:** Objection.

6 **THE COURT:** What's the objection?

7 **MS. MOSKOWITZ:** Form.

8 **THE COURT:** You mean in terms of leading?

9 **MS. MOSKOWITZ:** In terms of leading and the terms
10 used in the -- in the first part of that question, which now
11 has exited the screen.

12 **MR. SRINIVASAN:** I mean --

13 **THE COURT:** You can rephrase.

14 **MR. SRINIVASAN:** Sure.

15 **THE COURT:** I don't think it's really objectionable.
16 But go ahead, rephrase.

17 **BY MR. SRINIVASAN:**

18 **Q.** Is there a way for a user to avoid the Apple commission in
19 making an in-app currency purchase?

20 **A.** Yes.

21 **Q.** How would they do that?

22 **A.** So a game developer may make an in-app purchase available
23 on many platforms aside from the App Store. They can also
24 make that purchase available on desktop web or mobile web.

25 It's completely at the discretion of a game developer. And

1 then a user can choose where they'd like to purchase.

2 Q. And can you give us examples of games where that's
3 achievable?

4 A. One example would be Hearthstone which allows you to make
5 purchases on Battle.net on your PC, also on mobile web, also
6 in the iOS app.

7 Another example would be Roblox which allows you to make
8 purchases on web, on the desktop app, as well as iOS.

9 Another example would be Candy Crush which makes -- allows
10 you to make purchases in the mobile app, on desktop web, and
11 on Android.

12 So most of the time when I'm mentioning games that are
13 cross-platform, on the mobile side you can almost guarantee
14 they would also be available both as the app itself on Android
15 and the same in-app purchases on Android.

16 Q. Okay. And maybe we can -- let's do -- if we may, let's do
17 a demonstrative of what you're talking about here.

18 If we could put up one of the disclosed demonstratives.

19 (Demonstrative published.)

20 **BY MR. SRINIVASAN:**

21 Q. This is with respect to Hearthstone.

22 Before we get going on this, I think you mentioned the
23 game Hearthstone in your list of apps that allow this type of
24 functionality; is that right?

25 A. Correct.

1 Q. And what is Hearthstone?

2 A. It is a free-to-play game by Blizzard Entertainment. It
3 is a card battler or a card collecting game. So I call it a
4 card battler 'cause you're collecting packs of cards, building
5 a deck, and then battling others with that deck.

6 Q. Okay. And can players make purchases within Hearthstone?

7 A. They can. They can purchase expansion packs with content
8 as well as new cards or card decks.

9 Q. And what channels can you make purchases on with -- for
10 Hearthstone?

11 A. On the App Store. You can also purchase the same decks on
12 Android on the Google Play Store, as well as on Battle.net on
13 your PC or on mobile web or desktop web.

14 Q. Okay. And this particular demonstrative that we have
15 here, did you create this demonstrative?

16 A. I did.

17 Q. And how did you do that?

18 A. I recorded it on my phone.

19 Q. Okay. And do you recall when you did it?

20 A. Two days ago.

21 MR. SRINIVASAN: Okay. And, Your Honor, if we can
22 run the video, and is it all right if Mr. Schmid sort of
23 narrates that as we run it?

24 THE COURT: Okay, go ahead.

25 (Video playing.)

1 **THE WITNESS:** Okay. So we're entering Hearthstone,
2 which is on my phone. I'm already logged into my account.
3 It's a Battle.net account with my email address.

4 I'm going to see that I have no packs available to open.
5 So if I click my open packs, there's nothing there.

6 However, I can go back to the shop and see all the packs
7 that are available for purchase or all the bundles as well.

8 So I'm going to find one that I like. Scroll down here.
9 Forged in the Barrens is one of the newer expansion packs. So
10 I'm going to look at the card packs for that.

11 It is 2.99 for two packs. I'm not going to buy it here.
12 I'm going to exit the game. And I'm going to go mobile Safari
13 where I go to Battle.net. Again I'm logged into an account
14 that I've had since long before the App Store was around.

15 I click on Hearthstone, and I can see all the purchases
16 that are available on mobile web. I click Forged in the
17 Barrens. I buy a 2.99 pack. And, again, because I've had
18 this account since before the App Store, my payment
19 information is already saved in there. I click "pay now."

20 Okay. Purchase was successful. I go back to Hearthstone.
21 And upon log-in, it should immediately show the card packs.
22 It did in this case.

23 So card packs are granted. And I can see that little "2"
24 flag next to open packs, which means I have some packs I can
25 open. And I get to experience the joy of what is inside. We

1 have Toad of the Wilds, Sada [phonetic], Devouring Plague,
2 very nice.

3 And then the second pack, I won't name all the cards, but
4 it's very exciting for me.

5 **BY MR. SRINIVASAN:**

6 **Q.** So, and Mr. Schmid, I believe when you went to the web,
7 you purchased something, the card pack, for 2.99.

8 Was it the same card pack that you saw in the App Store?

9 **A.** Yes.

10 **Q.** Okay. And let's -- let's just quickly do another demo if
11 Your Honor will indulge us.

12 The next one -- well, Mr. Schmid, I think you mentioned a
13 game called Candy Crush?

14 **A.** Yes.

15 **Q.** And what is Candy Crush? Maybe that's a question
16 everybody in America knows but --

17 **A.** It is a match-three puzzle game on the App Store.

18 **Q.** Okay. And can players make purchases in Candy Crush?

19 **A.** They can.

20 **Q.** And what is the currency of Candy Crush?

21 **A.** Gold bars which then you can spend on boosts and other
22 items in the game.

23 **Q.** Okay. And where are these gold bars sold?

24 **A.** They're sold on desktop web, on Android marketplaces so
25 like Google Play and other -- other Android stores, as well as

1 iOS and -- yep, that's it.

2 **MR. SRINIVASAN:** Mr. Spalding, can you put up the
3 other demo, please.

4 (Demonstrative published.)

5 **BY MR. SRINIVASAN:**

6 **Q.** And before we get it rolling, can you tell us who created
7 this demo?

8 **A.** I created this demo.

9 **Q.** And how did you do it?

10 **A.** I recorded on my phone two days ago.

11 **Q.** Okay.

12 **MR. SRINIVASAN:** And, Mr. Spalding, if we could play
13 it.

14 (Video playing.)

15 **BY MR. SRINIVASAN:**

16 **Q.** And, Mr. Schmid, if you could tell us what's happening.

17 **A.** I'm logging into my Candy Crush account, which is very
18 sad, as you can see I'm only on level two.

19 But you notice in the top right, I have 30 gold bars in my
20 account.

21 And now I'm going to go to candycrush.com.

22 Oop, there we go.

23 Now I'm going to go to candycrush.com and request the
24 desktop website. So Candy Crush and the developer King have
25 chosen to really not support mobile as much for the web

1 payment because they'd like to push the users to the native
2 app. However, I could simply just click "request desktop
3 website," and I would receive the web version of Candy Crush
4 Saga.

5 Again I'm logged in. So this is my same account. I have
6 the same 30 gold bars.

7 Now I'm purchasing ten gold bars. I'm going to use PayPal
8 which simplifies payment on web. And then ten gold bars were
9 added to my account.

10 So if I go back to the native app, you could see a little
11 spinner, and then I have 40 gold bars.

12 **Q.** Thank you, Mr. Schmid.

13 We've -- we've looked at two examples now. And are there
14 other games that allow this same functionality?

15 **A.** There are. And it's completely at the discretion of a
16 game developer to pick if they'd like to offer purchasing on
17 mobile web or desktop web or any other platforms they choose.

18 PUBG MOBILE is a good example of another game that would
19 allow mobile web purchasing. Call of Duty: Mobile. There's
20 certainly a ton of examples.

21 **Q.** Okay. And does Apple do anything to prevent or discourage
22 developers from providing users the option of going outside
23 the App Store to make these purchases?

24 **A.** Absolutely not. So some developers will even bring the
25 question to us and will say this is what we're looking to do.

1 And we'll say great, you know, you're more than welcome to
2 make your purchase available in any other platform and we'll
3 make sure that that source is recognized in the native app.

4 **Q.** And other than going through the websites, as you showed
5 us, is there a way to obtain online currency in a
6 brick-and-mortar way as well?

7 **A.** Yes. There are some game developers, namely the biggest
8 ones like Roblox and Minecraft and Fortnite, that have gift
9 cards in brick-and-mortar stores. And same thing, they can
10 redeem those gift cards on mobile web or on any platform web,
11 and then they can use those inside of the native app.

12 **Q.** Okay. Let's change gears a bit, and I'd like to talk
13 about what your team does for developers.

14 Broadly speaking, what are the ways in which Apple invests
15 in the success of developers?

16 **A.** We invest tremendous amounts -- sorry -- a tremendous
17 amount of time and energy and money into building the best
18 platform for our game developers. It's hard to -- it's hard
19 to break it down, but I could give you three avenues which I
20 think would simplify it to some degree.

21 So we have -- we -- I'm sorry -- we have business and
22 marketing support. We have engineering support. And then we
23 also -- I'm sorry -- we have tools, developer tools and
24 products.

25 So again to break that down so it's a little bit more

1 clear, developer tools and products, marketing and business
2 support, as well as engineering support.

3 **Q.** Okay. And is this just for game developers, or is this
4 all developers in terms of the App Store?

5 **A.** It is all developers.

6 **Q.** And we'll go through the categories you mentioned, but why
7 does Apple make these investments in developers?

8 **A.** We want to be the best platform to develop a game or app
9 in the world.

10 **Q.** Okay. And does Apple have to compete for developers to --
11 to compete, in other words, for developers to come to the
12 platform?

13 **A.** Absolutely. I think that it would be silly to suggest any
14 developer that's looking to grow a business wouldn't be
15 thinking about mobile as a huge opportunity.

16 However, there's lots of options even within mobile. We
17 want to do more than just be a -- a checkbox for a platform
18 that a developer is going to ship a game or app on. We want
19 to be the -- the primary platform. We want to be the place
20 where they're spending time and energy and -- and committing
21 to our user base that they're going to really focus on
22 building a great experience for our users on the App Store.

23 **Q.** And with respect to the game space in particular, who does
24 Apple -- what other platforms does Apple compete with for
25 those developers?

1 **A.** We compete with Google Play and the other many Android
2 marketplaces. We compete with the consoles, so Switch,
3 PlayStation, Xbox. We certainly compete with PC and the --
4 the PC stores like Epic Games Store or Steam.

5 And now more and more we're competing with cloud gaming
6 and -- and the many companies that are getting involved in
7 cloud gaming.

8 **Q.** Turning back to the categories I think that you mentioned
9 of support that Apple provides, you mentioned tools. What
10 sort of tools does Apple make available to developers?

11 **A.** So we have tools like XCODE, which is how you build your
12 app and submit it to the App Store. We have tools like the
13 many API's that we build, or application programming
14 interfaces.

15 We have certainly the product side. So App Store Connect,
16 and the many ways that you can kind of build your app first --
17 or sorry -- build your business on the App Store. As well as
18 TestFlight and -- there's -- there's very -- there's many of
19 them.

20 **Q.** And -- and can you provide some examples of API's that
21 Apple makes available to developers?

22 **A.** Sure. The metal API which allows developers to really
23 create amazing graphics experiences on iPhone and iPad and
24 Mac. We also have API's like Spatial Audio where a developer
25 can actually take advantage of the awesome technology that

1 AirPods -- AirPods Pro allows, which is kind of to create a
2 really awesome 3D audio space.

3 We also have Core ML that many app developers can use for
4 machine learning. There -- there's a lot of them.

5 **Q.** Okay.

6 And -- and does Apple provide business tools in support
7 for developers?

8 **A.** Yes.

9 **Q.** And can you give us some examples of the type of tools
10 Apple -- Apple provides in this regard?

11 **A.** Sure. I mentioned App Store Connect which has things like
12 TestFlight to manage distribution of beta software. We also
13 have App Analytics where you can get an understanding of
14 things like retention and -- and monetization of users. And
15 then we also have Sales and Trends to actually manage the --
16 the incoming revenue from your business.

17 **Q.** And do you know if Epic in particular took advantage of
18 any of these tools and support opportunities?

19 **A.** They did.

20 **Q.** Okay. And can you give us any details of the types of
21 tools they took advantage of on the business side?

22 **A.** They certainly used TestFlight. They also used App
23 Analytics. And we supported them by answering questions about
24 how to -- how to analyze their analytics. And then they also
25 used things like ARKit to experiment with augmented reality in

1 other apps and games that they're producing.

2 **Q.** Okay. I think you then mentioned as another bucket
3 engineering and business management support. What kind of
4 engineering support does Apple provide developers?

5 **A.** So we provide engineering support in a number of ways. We
6 have our worldwide developer conference every year in which
7 developers can engage directly with our engineers on forums
8 and sometimes face to face when that was a thing.

9 And we also identify other situations in which our
10 engineering team can directly support a developer. So that
11 could be a phone call or an email or in some cases even face
12 to face.

13 **Q.** Okay. And what are the types of problems that the
14 engineering team is looking to help the developer with?

15 **A.** It certainly varies. There's things as simple as input
16 control and understanding how to best use controllers for your
17 game. There's things like the Metal Engineering Ecosystem
18 team that will engage with developers to help them better
19 optimize graphics performance on the device.

20 And then there's things like just developer technical
21 support which is a team under developer relations that can
22 engage with developers for all sorts of reasons.

23 **Q.** And did Epic benefit from engineering support from Apple?

24 **A.** Yes.

25 **Q.** Can you provide us some examples of the way in which Apple

1 interacted with Epic on the engineering support front?

2 **A.** Yes. So from day one, when we began supporting Fortnite
3 on the store, we had engineering engaging with not just Epic
4 for the game, but also on the Unreal Engine. And that was
5 support that grew over time. So it went from phone calls to
6 emails to even in person where we sent engineers to Cary to
7 support Epic.

8 **Q.** And were there any Epic-specific engineering issues that
9 Apple worked with Epic on to solve a problem?

10 **A.** I can recall one specific around memory usage and the
11 memory footprint of Fortnite. We were hoping -- we were
12 trying to have Epic update to a newer version of XCODE quicker
13 than they initially thought they could. So in order to do
14 that, we worked with them to reduce the memory footprint of
15 Fortnite so they could more quickly update to the newer
16 version of XCODE.

17 **Q.** Were the Apple and Epic engineers able to solve that
18 problem?

19 **A.** We were.

20 **Q.** Okay. Let's now turn I think to the last item that you
21 mentioned which was, I think, marketing and editorial support.

22 What types of marketing and editorial support does Apple
23 provide to developers?

24 **A.** There's two main buckets in which we provide marketing
25 support. There's owned and paid marketing.

1 Q. And what is owned marketing?

2 A. So owned marketing or channels that we have ownership over
3 or don't have to pay for placement on. So for instance, our
4 social media would be owned marketing. Our -- our emails that
5 we send out would be owned marketing to, you know, the opt-in
6 list that we have users sign up for. As well as the editorial
7 page itself. So that's inventory that while it is not
8 traditional marketing and we don't have that under the
9 marketing umbrella, is owned placements that we do have
10 control over.

11 Q. And did Apple deploy its owned marketing function on
12 behalf of Epic at any point?

13 A. Quite often.

14 Q. Okay. And any examples, say, for example, on the -- I
15 think you mentioned on the editorial side?

16 A. Editorial was very excited about Fortnite. And they took
17 every opportunity that was a big moment to highlight it to our
18 users. So for instance, season -- or -- Season 2 of
19 Fortnite -- I'm sorry -- Chapter 2 of Fortnite was a very big
20 moment on the App Store where we actually took over the Games
21 tab with all sorts of Fortnite art and also wrote a story on
22 the Today tab about Chapter 2.

23 Q. And what about the social media channel? Did Apple deploy
24 those efforts on behalf of Epic?

25 A. We did. We worked closely with Epic to -- to build a

1 strong social media strategy where we would tweet something
2 about Fortnite, they would retweet that. Or vice versa, we
3 would ask them to -- we would ask them if we could retweet
4 something that they had posted about Fortnite.

5 **Q.** Okay. And is -- do you have any way to quantify Apple's
6 efforts in this regard?

7 **A.** A really broad number would be --

8 **MS. MOSKOWITZ:** Objection, foundation.

9 **THE COURT:** Lay some foundation.

10 **MR. SRINIVASAN:** Sure.

11 **Q.** Are you aware specifically -- well, sir, did you work
12 directly on the Epic account?

13 **A.** I did.

14 **Q.** And were you aware of the social media engagements that
15 Apple was doing for Epic?

16 **A.** I was.

17 **Q.** Okay. And can you quantify the degree of those
18 engagements on behalf of Epic?

19 **MS. MOSKOWITZ:** Objection, foundation.

20 **THE COURT:** Overruled.

21 **THE WITNESS:** I can. So broadly speaking, Apple sent
22 over 500 million marketing communications about Fortnite.

23 **BY MR. SRINIVASAN:**

24 **Q.** Okay. You also mentioned paid marketing. What does paid
25 marketing include?

1 **THE COURT:** Okay. I am going to follow up. How do
2 you know that? That's a pretty specific number.

3 **THE WITNESS:** So I worked closely with the marketing
4 team, and we aggregated all the ways in which we communicated
5 with developer -- or sorry -- with users about Fortnite over
6 the time that it was on the store.

7 We were able to look historically and say, okay, between
8 our email -- and many of those -- those instances were
9 email -- between our email and our social media and our paid
10 marketing, it was over 500 million communications.

11 **THE COURT:** When did you do this analysis?

12 **THE WITNESS:** This was ongoing analysis. So we would
13 often look and wrap those numbers up to present to Fortnite
14 and to other teams at Apple to give an overview of what we
15 were doing to support this business.

16 But that most -- that aggregate number that I came up with
17 was a conversation that I had with Steve McGuigan who leads
18 our marketing team about August of 2020.

19 **THE COURT:** Proceed.

20 **BY MR. SRINIVASAN:**

21 **Q.** What -- what does paid -- I think you mentioned owned
22 marketing and paid marketing. What does paid marketing
23 include?

24 **A.** Paid marketing is any instance in which we're paying for
25 that specific placement. So it could be digital marketing

1 that's done on -- in a banner form on a website like the
2 *New York Times*. Or it could be a billboard that's posted. Or
3 it could be direct mail. That's all kind of forms of paid
4 marketing.

5 **Q.** Okay.

6 Do you have a sense of how much Apple spent on paid
7 marketing for Fortnite in particular?

8 **MS. MOSKOWITZ:** Objection, foundation.

9 **MR. SRINIVASAN:** I can lay some foundation, Your
10 Honor.

11 **THE COURT:** All right. Go ahead.

12 **BY MR. SRINIVASAN:**

13 **Q.** Well, let me -- let me back up a little bit.

14 Do you -- do you recall, Mr. Schmid, when this lawsuit was
15 filed?

16 **A.** I do.

17 **Q.** Okay. And do you recall when that was?

18 **A.** August 2020.

19 **Q.** Okay. And do you recall that soon after this lawsuit was
20 filed -- well, I'll ask you open-endedly.

21 Well, do you recall whether you submitted a declaration in
22 connection with this lawsuit?

23 **A.** I did.

24 **MS. MOSKOWITZ:** Objection, Your Honor has ruled on
25 this.

1 **THE COURT:** The fact of the submission is not
2 objectionable. Overruled.

3 **MR. SRINIVASAN:** Thank you, Your Honor.

4 **Q.** And -- and do you -- do you recall whether you did some
5 investigation into Apple's efforts on behalf of Fortnite in
6 connection with that declaration?

7 **A.** I did.

8 **Q.** Okay. And can you tell us the type of investigation you
9 did at that time?

10 **A.** Yes. So I worked with many of our cross-functional teams
11 to create an overview of all the support that we provided to
12 Epic over the course of our relationship.

13 **Q.** And separate from that investigation, you were -- are
14 you -- where would you say you fall within the people at Apple
15 who deal regularly with Epic?

16 **A.** I was certainly the most familiar with the account. And I
17 dealt with them more regularly than any other person at Apple.

18 **Q.** Okay. So in connection with all of these efforts, did you
19 come to learn about Apple's specific efforts on behalf of
20 Fortnite from an advertising and marketing perspective?

21 **A.** I did.

22 **Q.** Okay. And so with that in mind, Mr. Schmid, do you have a
23 sense of how much Fortnite -- or excuse me -- how much Apple
24 spent on marketing support to support Fortnite?

25 **A.** Yes. So in the last 11 months before Fortnite left the

1 App Store, we'd spent just under a million dollars.

2 Q. Okay. And how did that support that Fortnite received
3 from Apple compare to other games on the App Store?

4 A. It was far more than any other game I'd worked on at that
5 point and more than I've seen since.

6 Q. And let's now turn actually to your relationship with
7 Epic.

8 When did you first get involved with Epic?

9 A. I first joined the account in early 2018, roughly
10 February.

11 Q. And what was the nature of your support of Epic when you
12 first got involved?

13 A. At that point, I was still a member of the developer
14 marketing team, so my support focused largely on their
15 go-to-market strategy, helping them optimize their storefront,
16 doing some account or some system work on the back end with
17 them, and also just getting to understand their business.

18 Q. And what was the nature of your support of Epic after
19 Fortnite launched?

20 A. I would describe it as sort of a never-ending crescendo of
21 support. So I -- I initially started on the developer
22 marketing team, but then moved on to the business management
23 team and took over the account full-time.

24 Q. And was this a nine-to-five engagement in dealing with
25 Epic?

1 **A.** It was not.

2 **Q.** What was it like in terms of the touch points with Epic?

3 **A.** It was quite intense. So there were 3:00 a.m. phone
4 calls, 5:00 a.m. phone calls, Christmas phone calls. It was a
5 pretty demanding relationship.

6 **Q.** And between the time you started working with Epic and the
7 time Epic was no longer in the App Store, what percentage of
8 your overall time would you say you focused on Epic?

9 **A.** There were certainly moments where it was a hundred
10 percent of my week focused on Epic. I eventually did bring
11 others onto the account, so two members of my team as well as
12 a member of the games team in Australia, to help kind of
13 alleviate some of those around-the-clock issues.

14 But some weeks it would be on maintenance mode, and it
15 would be 10 percent of my time would be focused on Epic.

16 **Q.** And -- and how would you describe the overall relationship
17 between Apple and Epic during that two and a half period --
18 year period when Fortnite was on the App Store?

19 **A.** Fairly tumultuous. There was a lot of good times and a
20 lot of really stressful times. But I would, yeah, overall
21 describe it as tumultuous.

22 **Q.** And was it a net positive or a net negative that Fortnite
23 was on the App Store?

24 **A.** Absolutely a net positive.

25 **Q.** Okay. And why -- why do you say that?

1 **A.** This is an interesting one for me specifically. So
2 Fortnite was the hottest game at the time. I personally
3 played Fortnite. My family played Fortnite. We connected
4 over it. My son played it on the iPad. My wife played it on
5 PlayStation. I played it on my iPad with the controller. It
6 was a really awesome thing to be able to bring to the users on
7 the App Store. So personally, I thought it was incredibly
8 exciting.

9 Professionally, it was an amazing game and it was awesome
10 to be able to highlight to our users. It was also generating
11 lots of revenue. So it was, in my opinion, worth that effort
12 to give them that nonstop support in order to bring this to
13 our users.

14 **Q.** Okay. And how many times, do you know, was Fortnite
15 reviewed during its time on the App Store?

16 **A.** It was reviewed over 200 times.

17 **Q.** Okay.

18 And are you a member of the app review team?

19 **A.** I am not.

20 **Q.** Did you have a role in app review with respect to
21 Fortnite?

22 **A.** Only for advocating on their behalf.

23 **Q.** In what way did you advocate on their behalf?

24 **A.** So in a situation where there was some urgency around
25 getting Fortnite into review, I would often reach out to the

1 app review team and ask for their support in expediting a
2 review. Not approving a review, but just expediting a review.

3 **Q.** And how often did Epic request expedited app review?

4 **A.** In 2020 alone, it was over 80 times.

5 **Q.** Okay. And do you know why there were so many expedite
6 requests from Epic on the Fortnite app?

7 **A.** I do. So I came from mobile game development. I
8 understand and I empathize with our developers, especially
9 those that are kind of thriving on live ops. It's a term we
10 use in gaming which generally means that the lifeblood of your
11 game is bringing new content to your game on a very frequent
12 basis.

13 Fortnite did this incredibly well. They were always
14 bringing new content to the game. And we knew that it was --
15 it was important for their business to continue to provide
16 that content to users.

17 And because they were so focused on bringing content to
18 their game, they often couldn't take a step back and fix some
19 systemic issues or some -- some planning issues around
20 submissions to the platforms, specifically our platform, the
21 App Store.

22 **Q.** And I think you mentioned that there were 80-plus expedite
23 requests in 2020. Did Apple address these requests in a
24 timely way?

25 **A.** We did.

1 Q. Okay. I'm going ask you to turn back into your binder. I
2 think hopefully everybody has their binders, DX3427, sir.

3 A. (Reviewing document.)

4 Q. And let me know when you've had a chance to pull that up.
5 (Exhibit published.)

6 THE WITNESS: Okay. I'm there.

7 BY MR. SRINIVASAN:

8 Q. Okay. And can you tell us what this document is, DX3427?

9 A. It is an exchange with myself, Mark Grimm from our
10 developer relations team, and Mary Ann Brunson from the app
11 review team.

12 Q. Okay.

13 A. The content of the document is basically just describing
14 the ongoing need for expedites and app review asking us or
15 really pushing back on us and asking if this is really
16 necessary.

17 MS. MOSKOWITZ: Objection, Your Honor. This is
18 technically not able to be used by Apple. It's their own
19 hearsay.

20 THE COURT: This document was admitted as a business
21 record, correct?

22 MR. SRINIVASAN: We offer -- we're offering it as a
23 business record, Your Honor. We haven't had it admitted yet,
24 but we'd like to do that.

25 THE COURT: I'll admit it as a business record.

(Defendant's Exhibit DX4327 received in evidence)

MR. SRINIVASAN: Thank you, Your Honor.

Q. Mr. Schmid, did you participate in this chain?

A. I did.

Q. And what is the date of this email chain?

A. March 27th, 2019.

Q. And I think you already gave us a general sense of what this chain was.

If you could -- if I can just turn you to the first page of this document.

(Exhibit published.)

BY MR. SRINIVASAN:

Q. And at the bottom there, Ms. Brunson, I think it is, says at the very last sentence on that first page, quote, "It almost feels like they're abusing expedite requests due to a systemic issue on their end in the development QA submission process."

Did you agree with your colleague that Epic was abusing the expedite process?

MS. MOSKOWITZ: Objection.

THE COURT: Overruled.

THE WITNESS: I did not.

BY MR. SRINIVASAN:

Q. Can you tell us why?

A. Like I mentioned earlier, I truly understand the plight of

1 game developers especially that are operating at this speed.
2 So while I don't agree that they were abusing the expedite
3 request system, I do agree there was a systematic issue that
4 they were not addressing.

5 I would relate it to, you know, I'm -- I used to be very
6 late to things all of the time, and I would often have a
7 really good excuse. And my wife would understand that excuse.
8 But she would also say I would really like to see something
9 change in your planning and your behavior in order to prevent
10 this from happening. So if you know you're always late, you
11 should start planning things earlier.

12 Q. Okay. And let's turn to 3758 if you can turn to that in
13 your binder.

14 A. To be clear, I'm still always late to things.

15 (Reviewing document.)

16 (Exhibit published.)

17 **THE WITNESS:** Okay.

18 **BY MR. SRINIVASAN:**

19 Q. Can you tell us what 3758 is? Well, let me stop. Let me
20 ask first. Is this an email chain that you were on,
21 Mr. Schmid?

22 A. It is.

23 Q. And what was the date of the email chain?

24 A. It is my birthday, 2019, October 31st.

25 Q. And is this an email chain you had with folks at Epic?

1 **A.** I did.

2 **MR. SRINIVASAN:** Okay. We'd like to move 3758 into
3 evidence, Your Honor.

4 **MS. MOSKOWITZ:** No objection.

5 **THE COURT:** Admitted.

6 **MR. SRINIVASAN:** Thank you.

7 (Defendant's Exhibit DX3758 received in evidence)

8 **BY MR. SRINIVASAN:**

9 **Q.** And what was the context for this chain, Mr. Schmid?

10 **A.** Again, it was another example of an expedite request from
11 Epic in which Mark Grimm replied, explaining that, you know --
12 if I can read it. "We've had this emergency -- we've had
13 emergency patches with critical fixes every week," and
14 "emergency" and "critical" are in quotes.

15 And then he said, "I worry that these words are losing
16 their meaning." And then he expressed that there's concern
17 and we need to prioritize the submission to the App Store.

18 **Q.** Well, thank you for that.

19 First of all, who is Mark Grimm?

20 **A.** He is on our developer relations team, and he focuses on
21 games.

22 **Q.** Okay. And did you have an understanding of what Mr. Grimm
23 was conveying here in the email?

24 **A.** Yes.

25 **MS. MOSKOWITZ:** Objection.

1 **THE COURT:** You can testify as to your understanding,
2 which is what I understood the question to ask. Overruled.

3 **THE WITNESS:** So my understanding -- and -- and Mark
4 and myself and the others on this account were very much in
5 lockstep on this. My understanding was that he was saying
6 we're going to have a hard time continuing to justify
7 emergencies when every submission is an emergency.

8 **BY MR. SRINIVASAN:**

9 **Q.** Okay. Did you ever feel like you could push back and
10 simply not respond to the latest Epic emergency?

11 **A.** No.

12 **Q.** Why not?

13 **A.** There was certainly the concern and sometimes the threat
14 that we would be left behind and that our users would not
15 receive the latest update to Fortnite and could not play with
16 the other platforms if we did not get an expedited review
17 going.

18 So it was never a situation where I felt like it was
19 appropriate to say, no, we're not going to expedite this or
20 we're not going to -- to bring this up with app review.

21 **Q.** Okay.

22 In terms of the people you dealt with at Epic, what was
23 their reaction typically to Apple's various efforts to support
24 Epic and Fortnite on the App Store?

25 **A.** Generally very positive. The folks I worked with I became

1 quite close with. Many of them I consider friends still. And
2 it was a really close relationship. We were -- we were
3 working together in tough times and in good times so you
4 develop a personal connection with them.

5 **Q.** Okay.

6 Can you turn to DX4239, sir.

7 (Exhibit published.)

8 **THE WITNESS:** (Reviewing document.)

9 Okay.

10 **BY MR. SRINIVASAN:**

11 **Q.** Okay. And is 42 -- is this -- first of all, what is this
12 document, can you describe for us?

13 **A.** This is an email from Haseeb Malik to myself, Mark Grimm,
14 and Alec Shobin who was on his team, and it was sent
15 August 1st of 2019.

16 **Q.** Okay. And do you recall participating in this email
17 chain?

18 **A.** I do.

19 **MR. SRINIVASAN:** Okay. And Your Honor, we'd like to
20 move DX3958 into evidence.

21 **MS. MOSKOWITZ:** No objection. And, Your Honor, you
22 may note there has been a redaction so this will be subject to
23 a motion to seal.

24 **MR. SRINIVASAN:** I believe that redactions are --

25 **THE COURT:** So two things. One, it's 4239. Not 58.

1 Or unless I'm on the wrong one.

2 **MR. SRINIVASAN:** We are on -- we are on 4239, Your
3 Honor. Sorry if I misspoke.

4 **THE COURT:** Second, the redactions that I see are not
5 objectionable. Is there -- Ms. Moskowitz, is there an issue
6 with respect to the redactions?

7 **MS. MOSKOWITZ:** No. I was just noting that there was
8 one just beyond the emails that --

9 **THE COURT:** Yes, and I see it and I think it's
10 appropriate.

11 **MS. MOSKOWITZ:** Thank you.

12 **THE COURT:** So it's granted.

13 **MR. SRINIVASAN:** Thank you, Your Honor.

14 **Q.** And what is this email chain about, Mr. Schmid?

15 **A.** This is Haseeb thanking us. The subject line is "Thank
16 You." And it was after a -- you know, one of those moments
17 where we were working late and trying to get things through
18 the -- the pipeline, for lack of a better term, efficiently.

19 And he said, "in all of today's actions, it did not go
20 unnoticed that we propagated quickly. There was a highlight
21 mentioning in weekly Fortnite's stakeholders meeting today.
22 These wins truly matter to our teams here."

23 **Q.** And was Mr. Malik one of your primary points of contact at
24 Epic?

25 **A.** He was.

1 Q. And who were your primary contacts at Epic, by the way?

2 A. When I first started on the account, Mark Hutcheson, who
3 was the director of marketing at the time, was my primary
4 point of contact. He then moved over to the Epic Games Store
5 before leaving Epic.

6 After that, Brad Cummings who was on this team became the
7 main point of contact, who also moved over to the Epic Games
8 Store, and then left the company.

9 And then Haseeb Malik took over as director of mobile
10 marketing. He was my main point of contact before leaving the
11 company.

12 And then finally Alec Shobin, who is my most recent
13 contact and has been at Epic for some time now.

14 Q. And I'm -- was that four people that you listed --

15 A. Correct.

16 Q. -- at Epic? And then of those four, three left in the two
17 and a half years that you worked with them?

18 A. Correct.

19 Q. Okay. And then did you become -- I think you mentioned
20 this, but did you become personal friends with any of these
21 individuals?

22 A. Yes.

23 Q. Who are they?

24 A. All of them.

25 MS. MOSKOWITZ: Objection, relevance.

(Defendant's Exhibit DX3661 received in evidence)

MR. SRINIVASAN: Thank you.

Q. And who is Adam Sussman?

A. I believe he is the president of Epic Games.

Q. Okay. And then on -- on page 2 of this email, if you can go there.

(Exhibit published.)

BY MR. SRINIVASAN:

Q. Mr. Sussman writes you and your team an email that says, quote, "Apple team, thanks again for your time today, your engagement, and your tremendous support over the last few weeks." And then he goes on.

Do you know what -- do you have an understanding of what Mr. Sussman was thanking your team for?

A. Ongoing support. Generally there were -- there were pretty much endless live ops happening between all the -- the games and apps that Epic was managing at that time. So he was thanking us, I believe, specifically for the In The House campaign, which was a collaboration between their Houseparty app and their Fortnite game.

Q. Okay. And -- and this -- and this email came roughly a year ago; is that right?

A. Correct.

Q. And was Fortnite still on the App Store at this time?

A. It was.

1 Q. Okay. And let's finally turn to DX3958.

2 A. (Reviewing document.)

3 (Exhibit published.)

4 MS. MOSKOWITZ: Objection. I object to this document
5 shouldn't be on the screen. It's hearsay, former employee,
6 it's no party admission.

7 MR. SRINIVASAN: Your Honor, we're happy to discuss
8 the non-hearsay aspect of this document.

9 THE COURT: Well, why don't you discuss it first. I
10 can decide --

11 MR. SRINIVASAN: Sure.

12 THE COURT: -- whether to let in it later.

13 MR. SRINIVASAN: Okay.

14 Q. And, Mr. Schmid, do you recall -- well, do you recall the
15 day on which the Fortnite hot fix took place?

16 A. I do. It was August 13th, 2020.

17 Q. Okay. And you mentioned a Mr. Haseeb Malik earlier. Who
18 was he again?

19 A. He was at that time the former director of marketing,
20 mobile marketing for Fortnite.

21 Q. Okay. And do you recall that he sent you communication
22 that day?

23 A. He did.

24 Q. Okay. And do you recall -- first of all, what -- what did
25 he -- what did he communicate with you about in general?

1 **MS. MOSKOWITZ:** Objection. Relevance, hearsay.

2 **THE COURT:** What is the point?

3 **MR. SRINIVASAN:** The -- well, the point is what the
4 effect on Mr. Schmid was of the communication he received from
5 his former Epic colleague.

6 **MS. MOSKOWITZ:** Relevance.

7 **THE COURT:** Overruled. Go ahead.

8 **BY MR. SRINIVASAN:**

9 **Q.** And leaving aside what he said to you in particular, what
10 was your understanding of why Mr. Malik was communicating with
11 you on that day?

12 **A.** It was extremely relevant to all the work that we had done
13 together to see what had happened, you know, with Fortnite
14 essentially doing the hot fix, as we're calling it. He worked
15 so closely with our team to -- to do all these great things
16 together, that I'm sure he -- he felt some --

17 **THE COURT:** You can't testify as to what he felt.

18 **BY MR. SRINIVASAN:**

19 **Q.** Yeah. What was your -- what was your takeaway from that
20 communication from Mr. Malik that day?

21 **A.** My takeaway was that he was sympathizing for me and my
22 team after all the work that we had done. So I felt validated
23 by his message and his understanding of the situation, his
24 intimate understanding of situation.

25 **MS. MOSKOWITZ:** Objection. Foundation.

1 **THE COURT:** Well, he has no --

2 **MS. MOSKOWITZ:** Move to strike.

3 **THE COURT:** -- for his feelings, but it's -- I don't
4 know that it's really all that relevant. Move on.

5 **MR. SRINIVASAN:** Okay. Thank you, Your Honor. I --
6 I pass the witness.

7 **THE COURT:** Cross.

8 **MS. MOSKOWITZ:** May I proceed?

9 **THE COURT:** Proceed, Ms. Moskowitz.

10 **MS. MOSKOWITZ:** Lauren Moskowitz for Epic. Thank
11 you.

12 **CROSS-EXAMINATION**

13 **BY MS. MOSKOWITZ:**

14 **Q.** Good morning, Mr. Schmid.

15 **A.** Good morning, Ms. Moskowitz.

16 **Q.** It's nice to see you again.

17 **A.** It's nice to see you too.

18 **Q.** Thank you.

19 A couple of upfront questions.

20 You spoke earlier on direct about your work for a number
21 of game developers before you went to Apple; is that right?

22 **A.** Correct.

23 **Q.** Those were all mobile game developers, right?

24 **A.** Incorrect.

25 **Q.** You developed -- you worked for developers of console

1 games as well?

2 **A.** Correct.

3 **Q.** For the mobile development that you were doing, were you
4 developing for both Apple and Android?

5 **A.** Yes.

6 **Q.** Were there any games that you did just for Android?

7 **A.** Not that I can recall.

8 **Q.** You said that Apple, in your view, competes with consoles
9 and PC and other platforms on games. Do you recall that
10 testimony?

11 **A.** I do.

12 **Q.** Has Apple ever offered a better commission rate to any
13 developer to meet any competitive aspects of the business?

14 **A.** I can only speak to the game development side which is my
15 focus, and they have not.

16 **Q.** You're familiar with Sign in with Apple?

17 **A.** I am.

18 **Q.** Sign in with Apple is a mechanism offered by Apple that
19 allows users to sign in to third-party apps under the user's
20 Apple I.D., right?

21 **A.** Correct, or an obfuscated version of the Apple I.D.

22 **Q.** And one of the benefits of that in Apple's view is that
23 it's more -- a private way to sign in to third-party apps,
24 right?

25 **A.** Correct.

1 Q. For example, one of the features is the user can hide
2 their email from the third-party developer, right?

3 A. Correct.

4 Q. So with Sign in with Apple, you -- the user need not sign
5 up for an account with an individual developer in order to use
6 that third-party developer's app or even receive
7 communications in connection with that app, right?

8 A. I think that's a misunderstanding.

9 Q. So under Sign in with Apple, you do need to sign up to an
10 account with the third-party developer in order to use that
11 app and receive communications?

12 A. So a developer is allowed to tie --

13 Q. Yes or no? Do you need to sign up for an account with a
14 third-party developer if you want to use Sign in with Apple?

15 A. I don't think I can answer that question.

16 Q. You're just not familiar enough with the CWEB, the Sign in
17 with Apple process?

18 A. There's much more nuance than that a yes or no would allow
19 me to give you.

20 Q. Okay.

21 Apple mandates that all apps that want to offer any other
22 third-party log-in option like Facebook or Google must also
23 offer Sign in with Apple, correct?

24 A. Correct.

25 Q. You don't require that when the app does not want to offer

1 third-party log-in options, right?

2 **A.** Correct.

3 **Q.** You recall Epic, in fact, went through some issues with
4 setting up Sign in with Apple. Do you recall that?

5 **A.** I do.

6 **Q.** And do you remember they were having issues because Sign
7 in with Apple wasn't letting Epic collect information it
8 needed to collect to comply with parental verification laws?

9 **A.** I don't recall.

10 **Q.** Do you recall that the Sign in with Apple process wasn't
11 allowing Epic to collect that information that Epic needed to
12 identify users' date of birth to link them?

13 **A.** No. This would have been something the developer
14 relation --

15 (Simultaneous colloquy.)

16 **BY MS. MOSKOWITZ:**

17 **Q.** -- don't remember that?

18 **A.** This is not something my team would have handled.

19 **Q.** Do you use apps that use Sign in with Apple yourself?

20 **A.** Yes.

21 **Q.** Do you use the Sign in with Apple to sign in to those
22 apps?

23 **A.** I do.

24 **Q.** Are there any that you don't use Sign in with Apple for?

25 **A.** Yes.

1 Q. Why don't you use Sign in with Apple for those?

2 A. Some accounts I've had since before Sign in with Apple was
3 available.

4 Q. Is that the only instance?

5 A. Yes.

6 Q. Do you remember there was a question on direct about,
7 quote, users wanting to avoid commission to Apple and going
8 off of the native app to make purchases? Do you remember
9 that?

10 A. I do.

11 Q. Users don't know about any commission that's going to
12 Apple, right?

13 A. I could not tell you what broadly users are aware of and
14 not aware of when it comes to the commission rate.

15 Q. So you can't tell me that Apple forbids developers from
16 telling consumers that they charge a -- Apple charges a
17 commission?

18 A. That -- that is incorrect. Apple does not prevent
19 developers from telling users anything --

20 Q. Apple didn't stop Facebook from doing that?

21 A. I'm sorry. I could not speak to Facebook. They're not a
22 game developer.

23 Q. Okay. So you don't know anything about developers that
24 are other than game developers?

25 A. That is my focus.

1 Q. So you don't know one way or the other whether that
2 happened with Facebook?

3 A. Facebook is not an account that I am --

4 (Simultaneous colloquy.)

5 **BY THE WITNESS:**

6 Q. I'm not asking about whether they're an account you
7 handle. I'm asking are you aware that that happened?

8 A. I don't follow Facebook.

9 Q. You are not aware that that happened, no?

10 A. Can you repeat what you're asking --

11 Q. Are you aware --

12 **THE COURT:** Okay. The two of you, do not talk over
13 each other. And slow down.

14 **MS. MOSKOWITZ:** Thank you.

15 **THE WITNESS:** Sorry, Your Honor.

16 **BY MS. MOSKOWITZ:**

17 Q. Are you aware that Facebook publicly stated that Apple had
18 told them that they were to not tell the public that Apple was
19 charging them a 30 percent commission?

20 A. I'm actually not aware of that.

21 Q. You testified on direct that certain developers that have
22 native apps on iOS do have currency or content available for
23 purchase on web sites. You remember that?

24 A. Yes.

25 Q. And you have an understanding that Apple offered expert

1 testimony about what can and cannot be done on iOS?

2 **A.** I'm sorry?

3 **Q.** Are you aware that Apple offered expert testimony that
4 what -- about what can and cannot be done on websites through
5 an iOS device?

6 **A.** I am unaware of that.

7 **Q.** So you're not aware that Candy Crush was the subject of
8 some debate last week in court?

9 **A.** I am not aware of that.

10 **Q.** You don't play Candy Crush, do you?

11 **A.** I'm not a big Candy Crush player.

12 **Q.** You're not a Candy Crush player at all, are you?

13 **A.** I wouldn't say at all. I dabble. But I'm not a big Candy
14 Crush player.

15 **Q.** The video we showed -- you showed earlier, was that your
16 account?

17 **A.** That was a new account.

18 **Q.** So that was not your account?

19 **A.** No. Unfortunately I lost the log-in to my original
20 account.

21 **Q.** All right. So let's talk about Candy Crush.

22 You said you made that video yourself two days ago?

23 **A.** Correct.

24 **Q.** Were any Ph.D. economists involved in helping you?

25 **A.** They were not.

1 Q. Your video left a few things out, didn't it?

2 A. It did not.

3 Q. Didn't leave any steps at all out of the video?

4 A. It did not.

5 Q. All right. Well, it didn't show you logging into an
6 account on the app, did it?

7 A. Oh, I was already logged in, correct.

8 Q. Yeah, you were already logged in. Do you know how you
9 logged in to the app?

10 A. I believe in that occasion, I logged in -- I actually
11 don't know. I'm sorry, I can't recall exactly how I logged
12 in.

13 Q. Do you know anything about what a user's options are to
14 log in to Candy Crush on the native app?

15 A. There's -- they can certainly log in with a King account.
16 They can log in with some social media accounts. And then
17 they can also log in with Sign in with Apple.

18 Q. The video also didn't show you logging into the account on
19 the King.com website did it?

20 A. It did not.

21 Q. You were already logged in, right?

22 A. Correct.

23 Q. And do you know what a user's options are to log in to
24 Candy Crush on the website?

25 A. I believe they are the same as I mentioned for the native

1 app.

2 Q. You think that you can Sign in with Apple on the website?

3 A. I could not say definitively.

4 Q. Are you -- do you think you signed in with Apple on either
5 the native app or the website when you put that video
6 together?

7 A. I could not say.

8 Q. Are you aware that if a user does in fact Sign in with
9 Apple on the native app, your video doesn't work?

10 A. I am not aware of that.

11 Q. Are you aware that only a user who actually creates a King
12 account with their email and their password and logs in under
13 that King account on both the native app and the website does
14 that work?

15 A. I could not tell you.

16 Q. All right. Well, why don't we do it.

17 Let's walk through this in realtime instead of an edited
18 video.

19 My colleague, Ms. Hauserman, is here. And we're going to
20 do our best to connect the phone to the screen here and see if
21 we can figure that out.

22 A. Would it be possible to use my phone?

23 Q. No.

24 A. Okay.

25 MS. MOSKOWITZ: So, Ms. Hauserman, can you please

1 click on the Candy Crush app.

2 (Demonstrative published.)

3 **BY MS. MOSKOWITZ:**

4 **Q.** All right. Mr. Schmid, you can see here she's not
5 currently logged in, right?

6 **A.** Could you click play?

7 (Demonstrative published.)

8 **THE WITNESS:** She's going to have to go through the
9 first-time user experience in order to create an account.

10 **BY MS. MOSKOWITZ:**

11 **Q.** Right. Let's -- why don't we go back -- I'll be steering
12 the bus on this one.

13 Why don't you hit "Retrieve my progress" and see if she's
14 logged in.

15 (Demonstrative published.)

16 **BY MS. MOSKOWITZ:**

17 **Q.** Okay. So when she does that, she's presented with some
18 sign-in options, right?

19 **A.** Correct.

20 **Q.** And none of this was shown in your video, right?

21 **A.** I was already logged in, correct.

22 **Q.** And you see there are three options available?

23 **A.** Correct.

24 **Q.** All right. So sign up with Apple -- I'm sorry. Sign in
25 with email is there in the green. Do you see that?

1 **A.** Yes. It's the biggest one.

2 **Q.** Continue with Facebook.

3 **A.** Yes.

4 **Q.** And continue with Apple.

5 **A.** Yes.

6 **Q.** And below that there's an alternative, it says log in with
7 email.

8 **A.** If you already have an account, correct.

9 **Q.** And the sign up with email in green and the log in with
10 email both refer to having a King account, right?

11 **A.** I believe so, yes.

12 **Q.** And at the top, do you see this banner, it says "don't
13 lose your progress"?

14 **A.** Yes.

15 **Q.** All right.

16 **MS. MOSKOWITZ:** And if you scroll, Ms. Hauserman, to
17 the right, there's another part of that banner. It says, "You
18 decide where to play."

19 **Q.** Do you see that, Mr. Schmid?

20 **A.** I do.

21 **Q.** It says, "Use your King account to continue playing
22 anywhere and on any device."

23 Does that -- did I read that right?

24 **A.** Correct.

25 **Q.** You didn't show that in your video either, right?

1 **A.** I did not.

2 **MS. MOSKOWITZ:** All right. Why don't you scroll,
3 Ms. Hauserman one more, and let's just see if there's anything
4 of note.

5 **Q.** All right. Mr. Schmid, it does not say anywhere in this
6 screen "Go buy gold bars on our website." Does it?

7 **A.** It does not.

8 **Q.** In fact, it's against Apple's rules to say that, isn't it?

9 **A.** So as I clarified earlier, the developer's choice was
10 to --

11 **Q.** Sir?

12 **A.** -- push users --

13 **Q.** Sir?

14 **A.** -- towards the native app --

15 **Q.** Sir?

16 **A.** I'm sorry. Yes?

17 (Simultaneous colloquy.)

18 **BY MS. MOSKOWITZ:**

19 **Q.** I'm asking a yes or no question. It's against Apple's
20 rules to tell users that they can go outside of the app and go
21 make purchases of in-app currency, right?

22 **A.** Correct.

23 **Q.** So when you said on direct that Apple doesn't do anything
24 to stop developers from offering currency outside of the
25 native app, Apple does in fact tell them that they cannot tell

1 users they're doing that, right?

2 **A.** Only inside the native app.

3 **Q.** Meaning if someone's in the native app, they cannot be
4 told within that app that there's something they can do
5 elsewhere to buy content.

6 **A.** Correct.

7 **Q.** All right.

8 So let's go, now we're back to these options. Continue
9 with Apple's -- the same thing we were talking about when we
10 were talking about Sign in with Apple; is that right?

11 **A.** Correct.

12 **Q.** All right.

13 And you don't remember what you clicked for your video.

14 **A.** I truly do not.

15 **Q.** Well, let's see what happens if we try to do this with the
16 Sign in with Apple option.

17 **MS. MOSKOWITZ:** If Ms. Hauserman could please click
18 on "Continue with Apple."

19 (Demonstrative published.)

20 **MS. MOSKOWITZ:** Okay. And please go ahead and sign
21 in, Ms. Hauserman.

22 (Demonstrative published.)

23 **BY MS. MOSKOWITZ:**

24 **Q.** All right. You see we're now logged in there, Mr. Schmid?

25 **A.** I do.

1 Q. All right. And the game is now available to play and save
2 on the native app?

3 MS. MOSKOWITZ: You can exit out that, Ms. Hauserman.

4 Q. We now have the "My Account" screen and we're all logged
5 in, right?

6 A. Correct.

7 Q. All right.

8 MS. MOSKOWITZ: So please exit the app,
9 Ms. Hauserman, and let's go see about going to candycrush.com
10 like we saw in the video earlier.

11 THE WITNESS: Could you confirm the amount of gold
12 you have in the native app first?

13 BY MS. MOSKOWITZ:

14 Q. Sure.

15 (Demonstrative published.)

16 BY MS. MOSKOWITZ:

17 Q. Twenty. See that?

18 A. Thank you.

19 Q. Okay. All right. So we're going to navigate to
20 candycrush.com like we saw in the video.

21 (Demonstrative published.)

22 BY MS. MOSKOWITZ:

23 Q. And you see that redirects to you King.com, the
24 developer's website?

25 A. Correct.

1 Q. All right. The screen that comes up shows an install
2 button, right, that if pressed brings you back to the app,
3 right?

4 A. Correct.

5 Q. But your video showed us something else.

6 A. No.

7 Q. Your video showed something else happening after this
8 instead of going back to the App Store, right?

9 A. Correct.

10 Q. Okay. So yours showed us that if you go to that bar that
11 says AA, there's a few options that appear, right?

12 A. Yes.

13 Q. All right.

14 MS. MOSKOWITZ: So why don't you, Ms. Hauserman,
15 please hover over that and see what we have.

16 Q. So the request desktop website is what you clicked, right?

17 A. Correct.

18 Q. And that option tricks your device into thinking it's a
19 desktop and is no longer restricted to what the mobile
20 websites are either choosing or permitted to display, right?

21 A. It does not trick your device.

22 Q. It tells your device, instead of the mobile default
23 website, that it's going to go fetch a desktop version, right?

24 A. Incorrect. It tells the website that this is a desktop
25 client.

1 Q. Right. And it's not a desktop client, right?

2 A. Correct.

3 Q. And by the way, that's not the default setting, right?

4 A. Correct.

5 Q. Are you aware that certain desktop sites in fact don't
6 function on an iOS device?

7 A. Could you elaborate?

8 Q. Are you aware that some desktop sites don't allow you to
9 use your touch controls when used on an iOS device?

10 A. Are you referring to like a flash website or --

11 Q. Any -- any experience with this whatsoever? You showed us
12 a whole bunch of things you can do on a website. Have you
13 tried to use desktop sites for touch control activities?

14 A. I have.

15 Q. Okay. And are you aware that sometimes that does not
16 work?

17 A. I have not encountered that personally.

18 Q. Okay.

19 And do you think that this request desktop website is
20 widely known by users of iOS devices?

21 A. I do.

22 Q. And what's your basis for that?

23 A. It's my belief that it's clearly an option. We don't hide
24 it in any way, shape, or form. It's actually in a trafficked
25 area where we also put privacy reports and other settings.

1 Q. So people click on that double A routinely, in your
2 experience?

3 A. I certainly use it for Facebook.

4 Q. Okay.

5 MS. MOSKOWITZ: All right. So why don't we go ahead
6 and click that request -- request desktop website dropdown.

7 (Demonstrative published.)

8 BY MS. MOSKOWITZ:

9 Q. All right. So now we're on the desktop version that the
10 phone now thinks it's a desktop?

11 A. The website now believes the phone is a desktop.

12 Q. Okay. And so now we have a "play now" option. Is that
13 what you showed on your video?

14 A. It is.

15 Q. All right.

16 MS. MOSKOWITZ: So why don't we go ahead and go in
17 there. Play now.

18 (Demonstrative published.)

19 BY MS. MOSKOWITZ:

20 Q. And I guess just like your video, we're going to have to
21 resize the screen because the website still thinks we're on a
22 desktop, right?

23 A. Correct.

24 Q. All right.

25 MS. MOSKOWITZ: And Ms. Hauserman, there's a little

1 icon, it looks like a disk, right?

2 Q. Is that right, Mr. Schmid? That's the save button on the
3 left?

4 A. I believe so, yes.

5 Q. All right. So again we're not logged in, unlike what you
6 were on your video, right?

7 A. Could you click on that, please?

8 Q. Yeah, let's do that.

9 (Demonstrative published.)

10 **BY MS. MOSKOWITZ:**

11 Q. That pops up a log-in screen, right?

12 A. Yes.

13 Q. And why don't we make that a little bit bigger? We still
14 have to tell our website that we're on a phone.

15 Okay. So it says "save your progress." Do you see that?

16 A. I do.

17 Q. And it gives you an option to either set up an account or
18 in -- or in -- or to log in to an existing account?

19 A. Yes.

20 Q. And those are King.com accounts, right?

21 A. I believe so.

22 Q. You don't see continue with Apple anywhere there.

23 A. The developer has chosen not to provide that option.

24 Q. Okay. So there's no way for a user to log in to the Candy
25 Crush on the website through Sign in with Apple.

1 **A.** Could you click on log in to existing account just so we
2 can verify?

3 **Q.** Well, we're going to -- we're going to do that.

4 **A.** Okay.

5 **Q.** I'm just asking you, do you believe that there's any
6 evidence here that a Sign in with Apple option is available?

7 **A.** I do not see any.

8 **Q.** And logging in, of course, is a necessary step to
9 accomplish what you showed in your video, right?

10 **A.** Correct.

11 **Q.** You just didn't show that step in your video?

12 **A.** Correct.

13 **Q.** All right. So let's just try. Let's see what happens
14 when we log in with an existing account and we try to use our
15 Sign in with Apple.

16 **MS. MOSKOWITZ:** Ms. Hauserman, can you please click
17 on the log-in button.

18 (Demonstrative published.)

19 **BY MS. MOSKOWITZ:**

20 **Q.** All right. Enter the kingdom, it says, right?

21 **A.** Yes.

22 **Q.** So we're going to -- you want to us try our Sign in with
23 Apple, our Apple I.D. and password?

24 **A.** I do not.

25 **Q.** Okay. Well, if we did that, it wouldn't work, right?

1 **A.** Correct.

2 **Q.** Okay, so there's no option to sign in with Apple here.

3 **A.** The developer has not provided one in this instance.

4 **Q.** All right. So is it fair to say that you were in fact
5 signed in with a king.com account for your video?

6 **A.** Yes.

7 **Q.** All right.

8 And a user then, if they wanted to do what you did in your
9 video, can't take advantage of the Sign in with Apple option
10 and all the privacy and hide your email benefits associated
11 with it if they want to do what you showed in your video,
12 right?

13 **A.** At the developer's choice, they have not enabled that.

14 **Q.** Not for Candy Crush, right?

15 **A.** Correct.

16 **Q.** All right.

17 You also talked about Hearthstone. That's a game you
18 play, it sounded like?

19 **A.** Yes.

20 **Q.** All right. So you picked that game?

21 **A.** Yes.

22 **Q.** All right.

23 So that game is rated 115th as of yesterday in the
24 category cards. Would you dispute that?

25 **A.** I could not tell you one way or another.

1 Q. Okay.

2 And you're not under the impression that Epic is arguing
3 that there's not a single app that allows for virtual currency
4 to be purchased on an iOS web browser, are you?

5 A. No.

6 Q. Okay.

7 And again, that video -- we're not going to do the painful
8 reenactment -- also you were already logged in for that too,
9 right?

10 A. I'm always logged into Battle.net.

11 Q. Yeah, both on the app on the website, right?

12 A. Correct.

13 Q. All right.

14 And the options -- so just going back to that video as we
15 watched it, you scrolled through the shop within the app
16 first, right?

17 A. Correct.

18 Q. And the options to buy were right there. They were one
19 click away as you were scrolling through, right?

20 A. Correct.

21 Q. And your payment options were already saved as well on the
22 website.

23 A. Correct.

24 Q. And they're also saved on the native app?

25 A. Correct.

1 Q. Counsel asked you if the same -- if the same price on the
2 website was the same price -- he used the words "as in the App
3 Store." Do you remember that?

4 A. I do.

5 Q. You can't buy that stuff in the App Store, right? Only in
6 the native app, right?

7 A. I'm sorry?

8 Q. You can't buy that pack on the App Store, can you?

9 A. If the developer enabled promote an in-app purchase, you
10 could.

11 Q. Within the app you purchase that, not on the App Store,
12 right?

13 A. Promoted in in-app purchase allows you to sell in-app
14 purchases on the App Store directly.

15 Q. I can go on the App Store and buy that pack?

16 A. I could not tell you whether or not they have a promoted
17 in-app purchase for that pack. But the technology certainly
18 enables it.

19 Q. So are you aware of any games that are selling actual
20 content on the App Store itself right now?

21 A. I could not --

22 (Audio distortion.)

23 **THE WITNESS:** Oop.

24 I know there are many. We actually -- my team was focused
25 on in-app purchase a few years back as far as promoted in-app

1 purchase on the App Store so we worked with developers --

2 (Simultaneous colloquy.)

3 **BY MS. MOSKOWITZ:**

4 **Q.** Are there any today?

5 **A.** Certainly.

6 **Q.** Okay. When you were shopping around for the packs, there
7 was nothing on there that says "Go to our website and buy
8 those -- buy these packs." Right?

9 **A.** Correct.

10 **Q.** And that again is against Apple's rules, right?

11 **A.** Correct.

12 **Q.** Hearthstone is a Blizzard-developed app, right?

13 **A.** Yes.

14 **Q.** And that's the same app developer, app division Blizzard
15 King, right?

16 **A.** Yes.

17 **Q.** And that's the same as Candy Crush?

18 **A.** Correct.

19 **Q.** These are -- this is a big company?

20 **A.** Yes.

21 **THE COURT:** Was the price the same? Remind me. Was
22 the price the same, Mr. Schmid?

23 **THE WITNESS:** Oh, yes, Your Honor. It was 2.99 on
24 the mobile website and 2.99 on the App Store.

25 **THE COURT:** So the consumer paid the same?

1 **THE WITNESS:** I do believe there was tax on the
2 mobile website that was added to the 2.99, whereas the App
3 Store it was included in the price.

4 **THE COURT:** All right.
5 Go ahead.

6 **BY MS. MOSKOWITZ:**

7 **Q.** And there's no commission due to Apple if the purchase is
8 made on the website, right?

9 **A.** Correct.

10 **Q.** And if they wanted to offer a discount, could they
11 advertise that discount within the app?

12 **A.** A discount on a website --

13 **Q.** Yes.

14 **A.** -- within the app? They could not.

15 **Q.** Just one more question back on the Candy Crush.

16 You testified earlier that all of your new accounts that
17 you sign up for now that Sign in with Apple is available, you
18 use that to access third-party developer apps, right?

19 **A.** Correct.

20 **Q.** But you didn't do that for Candy Crush?

21 **A.** So I actually recovered a password from another Candy
22 Crush account that was a new account I had not used but was
23 created prior to Sign in with Apple.

24 **Q.** So the one that you used with the video, you went through
25 the steps to recover a prior email and password that you

1 would -- used however long ago instead of using Sign in with
2 Apple?

3 **A.** Correct.

4 **Q.** We talked a little bit about Houseparty. There was a
5 document you were shown by your counsel. Do you remember
6 that?

7 **A.** I do.

8 **Q.** Houseparty is an app, right?

9 **A.** It is.

10 **Q.** And Fortnite, while on iOS, was an app, right?

11 **A.** Correct.

12 **Q.** Houseparty is not a game, right?

13 **A.** It does have games inside of Houseparty.

14 **Q.** Is it a game?

15 **A.** It is not a game.

16 **Q.** Okay.

17 So Epic has both games and nongame apps?

18 **A.** They do.

19 **Q.** All right.

20 You also testified yesterday, I think, that Roblox is a
21 cross-platform game, I think is the word you used?

22 **A.** Correct.

23 **Q.** And you talked about how developers get to choose their
24 own category, right?

25 **A.** Correct.

1 Q. So if -- when Fortnite was available on the App Store and
2 Epic had decided it was not a game and belonged in the general
3 app category, would Apple have permitted that?

4 A. We would have permitted them to submit as such. However
5 we may have recategorized them in the app review process. But
6 I'm not a member of app review so I could not give you
7 specifics on how that would occur.

8 Q. So even if a developer chooses how they're going to be
9 categorized, that might be overruled by app review?

10 A. This is to prevent games like Fortnite from ending up in
11 the --

12 (Simultaneous colloquy.)

13 THE WITNESS: -- category --

14 BY MS. MOSKOWITZ:

15 Q. Yes or no?

16 A. -- or somewhere else like that.

17 Q. I'm just asking yes or no.

18 A. I'm sorry. Could you repeat?

19 Q. If a developer chose to submit their app as a specific
20 category that they viewed themselves in, that decision could
21 be overruled by app review and changed?

22 A. Yes.

23 Q. So, for example, if Fortnite -- and Epic thought Fortnite
24 should be in the entertainment category, for example, that
25 could have been overruled by app review?

1 **A.** Yes.

2 **Q.** And Roblox, can they just -- they can't just move out of
3 the games category if they want, right? That might be
4 overruled.

5 **A.** It could be overruled. They may attempt to do so on their
6 own -- at their own discretion.

7 **Q.** Are you aware that Roblox was escalated to the ERB to
8 decide whether it was a violation of apps -- Apple's -- excuse
9 me -- store within a store prohibition?

10 **A.** I am generally aware of that.

11 **Q.** Are you aware of what the outcome of that was?

12 **A.** I am not aware of what the direct outcome was other than
13 Roblox is still on the store.

14 **Q.** Why don't we -- actually we -- can you turn back to that
15 last tab in your binder. I believe it was TX5552 [sic] that
16 was the categories.

17 **A.** (Reviewing document.)

18 Sure.

19 **Q.** Are you there?

20 **A.** Yes, ma'am.

21 **Q.** Great.

22 There's games, the games description you had called out
23 during your direct. Do you recall that?

24 **A.** The games category, correct.

25 **Q.** Right. And it's defined as apps that provide single or

1 multiplayer interactive activities for entertainment purposes,
2 right?

3 **A.** Correct.

4 **Q.** Let's read entertainment, which starts unhelpfully on the
5 bottom of the prior page and continues onto the top, do you
6 agree with me, of the next page?

7 **A.** Yes.

8 **Q.** All right. And entertainment, not games, right?
9 Entertainment is not a game? That's --

10 **A.** I'm sorry.

11 **Q.** -- one of the other --

12 **A.** Entertainment is a separate category, correct.

13 **Q.** It's not within the games category?

14 **A.** Correct.

15 **Q.** And entertainment is defined as apps that are interactive
16 and designed to entertain and inform the user, et cetera,
17 right?

18 **A.** Correct.

19 **Q.** So both games and entertainment use the word "entertain"
20 in some form and "apps" and "interactive," right?

21 **A.** Correct.

22 **Q.** Are you aware that this trial is being covered by the tech
23 and gaming press?

24 **A.** Yes.

25 **Q.** And have you heard that there's been some testimony about

1 Roblox last week?

2 **A.** I have not heard anything about testimony at all.

3 **Q.** Did you read any of the press?

4 **A.** I have not.

5 **Q.** So you're not aware that Roblox was the subject of any
6 testimony?

7 **A.** I am not.

8 **Q.** So you're not aware then that Mr. Kosmyuka testified that
9 Roblox is not a game?

10 **A.** I am not aware of that.

11 **Q.** Okay.

12 So I take it then you're not aware that since that
13 testimony, it has been reported that Roblox has fundamentally
14 changed how it describes itself on its own website?

15 **A.** Could you elaborate?

16 **Q.** Sure.

17 **MS. MOSKOWITZ:** Your Honor, I'm going to hand up, if
18 I may approach, some binders for the testimony.

19 **THE COURT:** Okay.

20 (Off-the-record discussion.)

21 **THE COURT:** And I will note all witnesses were
22 instructed not to listen to testimony. So it's a good thing
23 you followed my order.

24 **THE WITNESS:** That gave me a break from the news,
25 Your Honor.

(Handing binder.)

BY MS. MOSKOWITZ:

Q. Why don't you please turn in your binder to PX1846.

A. (Reviewing document.)

Okay.

Q. All right. Do you see this is an article that was published on *The Verge* last week with the title "Apple said Roblox developers don't make games and now Roblox agrees"?

A. Yes, but I've never seen this article.

Q. But I read the title correctly?

A. Correct.

Q. Okay. So if you look at this article, you'll see there's a reference in here on the second page to changes that Roblox made on its website. Do you see that?

MR. SRINIVASAN: Objection, Your Honor. He hasn't seen it. Well, I'll just object, foundation.

THE COURT: Well, I need a question first.

So so far there's nothing objectionable. Let's hear what the question is.

BY MS. MOSKOWITZ:

Q. So the question for now is do you see that there's discussion of changes that Roblox made on its website?

THE COURT: So you want him to read the whole thing?

MS. MOSKOWITZ: No. He can read the first full paragraph on page 2.

1 **THE WITNESS:** (Reviewing document.)

2 Just one moment, please.

3 Okay.

4 **BY MS. MOSKOWITZ:**

5 **Q.** This article is describing changes that Roblox made on its
6 website, right?

7 **A.** Yes.

8 **Q.** And it's no longer -- it says it's no longer using the
9 word "game," Roblox is no longer using the word "game on its
10 website.

11 **A.** To describe Roblox or the experiences within Roblox?

12 **Q.** It says here, does it not, that the word "game" has been
13 replaced by "experience" across nearly the entire Roblox
14 website.

15 **A.** But that's just the categories or the experiences within
16 Roblox. It's not saying that Roblox has decided they are no
17 longer a game.

18 **Q.** Have you gone to the Roblox website recently?

19 **A.** I have, yes.

20 **Q.** When's the last time you went there?

21 **A.** Two days ago.

22 **Q.** Two days ago, the same day you made the videos?

23 **A.** Correct.

24 **Q.** Was that in preparation for today?

25 **A.** Actually it was multiple reasons, one being --

(Simultaneous colloquy.)

BY MS. MOSKOWITZ:

Q. Was it one of them in preparation for today?

A. Yes.

Q. Okay. So you were preparing to talk about Roblox today.

MR. SRINIVASAN: Objection, Your Honor. This is getting into privileged territory.

THE COURT: Sustained.

BY MS. MOSKOWITZ:

Q. Okay. So are you aware that Roblox has user-generated content within the app?

A. I am.

Q. Apple does not take the position that it has to review that content as part of app review, right?

A. In the specific case of Roblox, correct.

Q. That's instead governed by the user-generated content guidelines, right?

A. Correct.

Q. Is there any discipline being considered by Apple against Roblox at the present time?

A. Not that I'm aware of.

Q. You interact with Roblox?

A. Quite frequently.

Q. You're familiar as a -- in your role with the DPLA, the Developer Program License Agreement that developers have to

1 enter into if they wish to distribute apps to consumers,
2 right?

3 **A.** Yes.

4 **Q.** And the DPLA has a Schedule 2 that goes with it, right?

5 **A.** I could not say for sure.

6 **Q.** Okay. Apple recently revised Schedule 2. Are you aware
7 of that?

8 **A.** I am not.

9 **Q.** All right. Let's look at PX2943. It should be in your
10 binder.

11 **A.** (Reviewing document.)

12 Okay.

13 **Q.** You're with me?

14 **A.** I am with you.

15 **Q.** All right.

16 This is Schedule 2, dated March 31, 2021, on the bottom
17 there. Do you see that?

18 **A.** I do.

19 **MS. MOSKOWITZ:** Your Honor, I offer PX2943 into
20 evidence.

21 **THE COURT:** No objection?

22 **MR. SRINIVASAN:** I'm looking, Your Honor. I don't
23 know that -- we don't -- I don't think we have PX2943 in our
24 binder.

25 **THE COURT:** I have it in mine. Double-check.

1 It's --

2 **MR. SRINIVASAN:** I have PX2906, counsel.

3 **THE COURT:** Yeah, it's supposed to be right after
4 2906.

5 **MR. SRINIVASAN:** I'm sorry. We found it was stuck.
6 Apologies.

7 No objection.

8 **THE COURT:** Admitted.

9 (Plaintiff's Exhibit PX2943 received in evidence)

10 **MS. MOSKOWITZ:** Thank you.

11 **Q.** Do you recognize this as the most up-to-date Schedule 2 to
12 the DPLA?

13 **A.** I could not say.

14 **Q.** This new Schedule 2 started to roll out in March of this
15 year, right?

16 **A.** The date on the document is March.

17 **Q.** March 31?

18 **A.** Correct.

19 **Q.** Have you -- do you make it your practice to get familiar
20 with the terms and conditions that are being imposed on
21 developers?

22 **A.** When relevant to game developers, yes.

23 **Q.** Okay.

24 Schedule 2 is relevant to game developers, right?

25 **A.** I have not read through this so I could not say for sure.

1 Q. Schedule 2 describes commissions, right?

2 A. (Reviewing document.)

3 Would you like to give me one moment?

4 Q. You're just not -- you don't know -- you don't know one
5 way or the other?

6 A. Well, I'd like to at least quickly review it.

7 Q. That's okay. If you don't know, that's fine. We're not
8 going to talk about the commission in this document. I was
9 just asking if you were aware that this covers it or not.

10 Okay. Let's look at section 7 on page PX2943.9.

11 A. (Reviewing document.)

12 Q. Section 7 is titled "Termination." Let me know when you
13 get there.

14 A. (Reviewing document.)

15 I am there.

16 Q. All right.

17 Are you familiar with this clause?

18 A. (Reviewing document.)

19 Just one moment. I'm just reading over it.

20 Q. I'm going to focus on 7.1. If you could focus your
21 attention on that.

22 A. (Reviewing document.)

23 Yes, I'm familiar.

24 Q. Okay.

25 And you've read this before today?

1 **A.** I've not read the document, but I'm aware of that part of
2 the DLPA.

3 **Q.** Okay.

4 This 7.1 is -- has new language, right?

5 **A.** I could not say.

6 **Q.** You think that the language in 7.1 has always been there?

7 **A.** I could not say.

8 **Q.** Okay. But you're aware of the language in 7.1?

9 **A.** As I read it today.

10 **Q.** But it's not the first time you're familiar with the
11 contents of that? Is that what you just testified?

12 **A.** I'm familiar with this generally, yes.

13 **Q.** All right.

14 The -- the language -- the new language at the end here
15 starts "If at any time." Do you see where I am?

16 **A.** I do.

17 **Q.** It says, "If at any time Apple determines or suspects that
18 you" --

19 (Exhibit published.)

20 **BY MS. MOSKOWITZ:**

21 **Q.** -- "or any developers with which you are affiliated have
22 engaged in or encouraged or participated with" -- "with
23 other developers to engage in any suspicious, misleading,
24 fraudulent, improper, unlawful, or dishonest act or omission,
25 Apple may withhold payments due to you or such other

1 developers."

2 Did I read that correctly?

3 **A.** Correct.

4 **Q.** So under these new terms, Apple can withhold payments due
5 to developers that were paid by consumers if Apple even
6 suspects that a developer with which a developer is affiliated
7 has engaged in suspicious behavior, right?

8 **A.** I personally never had to deal with this --

9 (Simultaneous colloquy.)

10 **BY MS. MOSKOWITZ:**

11 **Q.** Is that the import of this provision?

12 **A.** Yes.

13 **Q.** So let's break it up a little bit.

14 Starts out by saying "If at any time Apple even" --

15 **THE COURT:** Ms. Moskowitz, are you representing to
16 the Court that this is -- was not in the prior version?

17 **MS. MOSKOWITZ:** I am.

18 **THE COURT:** Okay. And what was the date of the prior
19 version?

20 **MS. MOSKOWITZ:** This version -- any -- any iteration
21 of Schedule 2 that was in existence and entered into before
22 this new one came out in March 31st was the prior version.

23 **THE COURT:** What was the -- what was the date of a
24 prior version?

25 **MS. MOSKOWITZ:** I'll have to get the -- the last

1 release update date, and I will get that for Your Honor.

2 **THE COURT:** Thank you. Proceed.

3 **BY MS. MOSKOWITZ:**

4 **Q.** So under the new terms here, the beginning says even if
5 Apple, quote, suspects, right?

6 **A.** Determines or suspects.

7 **Q.** Right.

8 **A.** Correct.

9 **Q.** Or suspects, right?

10 **A.** Correct.

11 **Q.** And there's nothing in here that states what standard
12 Apple will be applying to determinations or their suspicions,
13 right?

14 **A.** I do not see that.

15 **Q.** So let's look at the conduct it's talking about.

16 (Exhibit published.)

17 **BY MS. MOSKOWITZ:**

18 **Q.** It says, "engaged in or encouraged or participated with
19 other developers," right?

20 **A.** Correct.

21 **Q.** And there's no definition of what it means to encourage,
22 right?

23 **A.** I think it's pretty clear, but there is no definition,
24 correct.

25 **Q.** Would a supportive tweet do it?

1 **MR. SRINIVASAN:** Objection, foundation, Your Honor.

2 **THE WITNESS:** I'm sorry. I'm not a part of app
3 review, nor am I part of a legal team that could determine
4 something like that.

5 **BY MS. MOSKOWITZ:**

6 **Q.** Okay. The legal team gets involved?

7 **A.** This is a legal document.

8 **Q.** So you don't know whether someone sending out a supportive
9 tweet would be viewed as encouragement or not?

10 **MR. SRINIVASAN:** Objection, foundation.

11 **THE COURT:** Sustained.

12 **BY MS. MOSKOWITZ:**

13 **Q.** All right. So you don't know, though, what rises to the
14 level of encouragement, right?

15 **MR. SRINIVASAN:** Same objection.

16 **THE COURT:** All he can testify to is his
17 understanding. Just like any developer, you can answer as to
18 your understanding.

19 **THE WITNESS:** So my understanding of encourage?

20 **BY MS. MOSKOWITZ:**

21 **Q.** No. I'm asking if it's your understanding -- do you have
22 any understanding as it's used in this document about what
23 rises to the level of encourage in this provision?

24 **THE COURT:** On behalf of Apple? Is that what you're
25 asking? Because that would be inappropriate.

1 **MS. MOSKOWITZ:** In connection with his role as the
2 head of games, does he have an understanding as to what this
3 word means as used in Schedule 2.

4 **THE WITNESS:** I'd like to correct you. Head of games
5 business development. So I don't focus on app review or any
6 matters that touch app review.

7 **BY MS. MOSKOWITZ:**

8 **Q.** So is the answer that in that capacity you don't have any
9 understanding as to what this word means in Schedule 2 that
10 all developers sign?

11 **A.** It would be inappropriate for me to make a determination
12 there.

13 **Q.** So the answer is no, you don't.

14 **A.** I'm sorry?

15 **Q.** You don't have any understanding.

16 **A.** Not in an official Apple capacity, I could not make that
17 determination.

18 **Q.** So you would -- the only understanding you would have is
19 the English language; is that what you're distinguishing?

20 **A.** I understand the English language, yes.

21 **Q.** I am sure you do. I guess I'm just asking is that what
22 you're distinguishing here?

23 **A.** That was my distinguish -- yes.

24 **Q.** Okay. Is the same true for what "participation" means?

25 **A.** Correct.

1 Q. Okay.

2 Did you tell me when the last time is that you think you
3 saw this document, if you ever saw it?

4 A. I've certainly signed it as a developer, but I do not make
5 it a habit to frequently read it.

6 MS. MOSKOWITZ: Your Honor, I have the answer.

7 THE COURT: Thank you.

8 MS. MOSKOWITZ: The prior Schedule 2 is dated
9 June 22, 2020, and it's PX2621, which I believe is in
10 evidence.

11 THE COURT: Great. Thank you.

12 MS. MOSKOWITZ: Thank you.

13 Q. Okay.

14 So let's just continue on here and look at the conduct
15 that are the no-no's here. It talks about suspicious,
16 misleading, fraudulent, improper, unlawful, or dishonest act
17 or omission, right?

18 A. Correct.

19 Q. And there are no definitions on any of those terms?

20 A. Correct.

21 Q. So this provision is basically guilt by association
22 provision, right?

23 MR. SRINIVASAN: Objection, foundation.

24 THE COURT: That's argumentative. Sustained.

25

1 **BY MS. MOSKOWITZ:**

2 **Q.** This applies not only to a developer, but all of the
3 developers that are affiliated with any developer who signs
4 this agreement, right?

5 **A.** I could not make that determination.

6 **Q.** Do you know how Apple defines "affiliates"?

7 **MR. SRINIVASAN:** Objection, foundation. I guess --

8 **THE COURT:** Sustained. I do get the point if you
9 want to move on.

10 **MS. MOSKOWITZ:** Sure.

11 **Q.** Just a few more questions on that.

12 Mr. Schmid, you used the word "affiliates" in your
13 declaration, right?

14 **A.** I did.

15 **Q.** Okay. And we talked about the definition of "affiliates"
16 in your deposition?

17 **A.** We did.

18 **Q.** All right. Your view is an affiliate is anyone who has
19 any stake in a company, right?

20 **A.** That was a part of my definition, correct.

21 **Q.** Okay. So for Epic, for example, that would include
22 Tencent and Sony, for example.

23 **A.** Correct.

24 **Q.** And Sony, in turn, would have a number of affiliates.

25 **A.** Correct.

1 Q. And similarly Tencent has a number of affiliates.

2 A. Correct.

3 Q. Activision Blizzard King might be one, right?

4 A. Correct.

5 Q. All right.

6 So this is not just a termination clause, though, right?

7 It also allows Apple to withhold payments due?

8 MR. SRINIVASAN: Objection, foundation.

9 THE COURT: You can answer if that's what you
10 understand by reading it.

11 THE WITNESS: That is my understanding.

12 BY MS. MOSKOWITZ:

13 Q. And Schedule 2 as well as all of the DPLA terms are
14 non-negotiable, right?

15 A. Correct.

16 Q. And it -- this Schedule 2 is not just given to new
17 developers, right? It's given to all developers as soon as
18 they want to make an update to any of their apps, right?

19 A. Correct.

20 Q. So if a developer had been on iOS for years and had
21 invested in a number of apps, they have no choice if they want
22 to continue to offer those apps and update them to enter
23 Schedule 2.

24 A. We give developers a reasonable amount of time to sign and
25 update their DLPA, correct.

1 Q. But they have to do it.

2 A. They do have to do it.

3 Q. You think that Apple's competing with other platforms, you
4 said?

5 A. I do.

6 Q. Have you ever seen a provision like this on any other
7 platform whatsoever?

8 A. I could not tell you with certainty.

9 Q. You testified about a number of tools that are available
10 to developers. Do you recall that?

11 A. I do.

12 Q. So you don't know whether Apple's tools are funded by App
13 Store revenue, right?

14 A. Could you clarify?

15 Q. You don't know how those tools are funded, right?

16 A. I don't deal with that whatsoever, correct.

17 Q. And you, for example, have no idea whether any App Store
18 revenue is used to fund investment in those tools?

19 A. I would have no knowledge of that, correct.

20 Q. All right.

21 You're aware of the developer fee that developers pay to
22 become members of the developer program?

23 A. I am aware of the \$99 fee, yes.

24 Q. And that's also not part of the App Store revenue, right?

25 A. I'm not aware of that and I cannot speak to it.

1 Q. Okay.

2 You testified that Fortnite had some issues with memory
3 that some engineers were helping with. Do you remember that?

4 A. I do.

5 Q. Unity had the same issue, right?

6 A. I do not recall.

7 Q. Aspyr, same issue?

8 A. I'm sorry?

9 Q. A-S-P-Y-R?

10 A. Aspyr?

11 Q. Sure. Sorry, I'm not in the industry.

12 THE COURT: You must not be a gamer either then,
13 Ms. Moskowitz.

14 MS. MOSKOWITZ: I do play Candy Crush.

15 THE WITNESS: What level are you?

16 MS. MOSKOWITZ: Really high. Embarrassingly high.

17 THE WITNESS: I could not tell you whether Aspyr had
18 a memory issue. I was -- at that point in time, I was only
19 managing the relationship with Fortnite and one other
20 developer.

21 BY MS. MOSKOWITZ:

22 Q. And so you couldn't tell me if any other developers,
23 other -- other than those two had the similar issue?

24 A. I -- the other developer I was managing did not have that
25 issue. So I could only speak towards Fortnite.

1 Q. Do you recall that the issue was associated with iOS 11
2 that had certain memory allocations issues?

3 A. I do recall, yes.

4 Q. So -- and in iOS 12, there was a change in those
5 allocations. Do you remember that?

6 A. I do.

7 Q. And that's what caused these memory issues with certain
8 developers?

9 A. It functionally reduced the amount of available memory for
10 a developer to leverage in certain circumstances. So that was
11 the crux of the issue, and we did help resolve it.

12 Q. And you didn't just do that for Epic, you did that for a
13 number of developers who were having the same issue?

14 A. I could not say.

15 Q. You talked a bit about marketing support that Apple
16 provides. Do you remember that?

17 A. I do.

18 Q. And I think you said that Apple spent close to a million
19 dollars on paid marketing for Fortnite.

20 A. Correct.

21 Q. Do you have an understanding as to what Apple made in
22 commissions offer of Fortnite during the life of Fortnite on
23 iOS?

24 A. I do.

25 Q. How much?

1 **A.** Over \$100 million.

2 **Q.** Okay.

3 So \$1 million spent, a hundred million earned?

4 **A.** \$1 million spent in the final 11 months that Fortnite was
5 on the platform.

6 **Q.** How long was Fortnite on altogether?

7 **A.** Two and a half years.

8 **Q.** Okay. Do you have any understanding as to what the spend
9 was in the overall?

10 **A.** I don't, but it was more than a million.

11 **Q.** But you can't say how much more?

12 **A.** I could not.

13 **Q.** Apple doesn't pay to feature apps on the App Store, right?

14 **A.** Correct.

15 **Q.** When you gave the estimate of a hundred million, is that
16 based on your knowledge, or is that a guess?

17 **A.** I said over -- over a hundred million.

18 **Q.** Is it potentially over 200 million?

19 **A.** It would be inappropriate for me to say for sure. I do
20 know it's over a hundred million.

21 **Q.** Okay.

22 And so Apple also, we were just -- I interrupted myself.
23 I asked you that Apple does not pay for featuring within the
24 App Store on iOS, right?

25 **A.** Correct.

1 Q. Okay. And Apple doesn't pay anyone to feature an app in
2 conjunction with Apple Music, for example?

3 A. Correct.

4 Q. Is it your testimony that Apple's marketing support in any
5 way drove Fortnite revenue?

6 A. Yes.

7 Q. Okay.

8 You don't have an -- any understanding one way or the
9 other as to how much of Fortnite's earnings on iOS are
10 attributed to marketing and promotional support provided by
11 Apple, are you?

12 A. That would be extremely difficult to calculate or
13 attribute.

14 Q. So the answer is no?

15 A. I do not.

16 Q. Okay. You have no understanding as to how many Fortnite
17 transactions within the iOS ecosystem were made as a result of
18 advertising by Apple, right?

19 A. I do not.

20 Q. Your team does not track how many revenue -- how much
21 revenue can be attributed to App Store placement or featuring,
22 right?

23 A. Not on a regular basis.

24 Q. They don't do it at all, right?

25 A. We can certainly look at what we believe --

(Simultaneous colloquy.)

BY MS. MOSKOWITZ:

Q. I'm just asking if they -- if they do it? Does your team track it?

A. Revenue associated with editorial featuring?

Q. Yes.

A. Yes.

Q. Okay.

MS. MOSKOWITZ: Your Honor, I handed up a deposition binder. And I will ask for Your Honor to look at page 127, lines 4 through 11.

(Pause in the proceedings.)

THE COURT: Okay. Go ahead.

BY MS. MOSKOWITZ:

Q. Mr. Schmid, are you on page 127, lines 4 through 11?

A. The small page 127?

Q. I --

A. -- page 127.

Q. It should be the page of deposition marked 127 on maybe in the upper right-hand corner.

A. (Reviewing document.)

Okay. I think I'm there, yes.

Q. Okay.

You testified under oath at your deposition?

A. I did.

1 Q. Lines from 4 to 11, you were asked the following question
2 and gave the following answer.

3 "Q. From your perspective, Apple does not
4 attempt to track for games or other apps that
5 are offered through the App Store how much
6 revenue can be attributed to App Store placement
7 or featuring?

8 "A. My team does not focus on that so I
9 couldn't speak for any other teams at Apple."

10 I read that correctly?

11 A. You did.

12 Q. You also testified on direct about some of the editorial
13 support that Fortnite received from Apple. Do you recall
14 that?

15 A. I do.

16 Q. You don't know what the process is, though, for
17 determining which developers or which apps receive editorial
18 support, right?

19 A. Editorial makes those decisions.

20 Q. Right. It's not even a conversation you're involved in,
21 right?

22 A. We're involved in that conversation.

23 Q. All right.

24 MS. MOSKOWITZ: Your Honor, page 105, please,
25 lines 13 to 23.

1 Specifically 22 to 23.

2 **THE WITNESS:** If I could clarify.

3 **THE COURT:** Hold on.

4 (Pause in the proceedings.)

5 **THE COURT:** Go ahead.

6 **BY MS. MOSKOWITZ:**

7 **Q.** Mr. Schmid, you were asked the following question and gave
8 the following answer:

9 "Q. What is your understanding as to the
10 criteria that the editorial team lays out for
11 picking developers to be the recipients of
12 editorial support?

13 "A. My understanding is that their main bar
14 is around quality, and quality being a number of
15 things within a game. I couldn't say
16 specifically which editors have different levels
17 of what quality means to them or what criteria
18 they're looking for. And it is not a
19 conversation I'm even involved in."

20 Did I read that correctly?

21 **A.** You did.

22 **Q.** You testified on direct about social media as well. Do
23 you remember that?

24 **A.** I do.

25 **Q.** You have no understanding though, sir, of the size of App

1 Store's social media channels relative to Fortnite's social
2 media channels, right?

3 **A.** Off the top of my head, I do not.

4 **Q.** And you do not have any understanding as to whether and to
5 what extent Apple's social media posts with respect to
6 Fortnite actually drive any purchases within Fortnite, right?

7 **A.** I do not.

8 **Q.** And you don't recall any studies being undertaken within
9 Apple to understand whether social media posts were driving
10 Fortnite purchases.

11 **A.** I cannot recall.

12 **Q.** You -- you talked about advertising and marketing support.
13 Let's talk about another aspect of a developer's experience on
14 the App Store. You're familiar with paid search?

15 **A.** Yes.

16 **Q.** And that's an Apple program that lets developers submit
17 bids to have their apps come up in searches for certain key
18 words that a user might type into the search bar on the App
19 Store, right?

20 **A.** Yes. That is a separate team.

21 **Q.** But you're familiar with it?

22 **A.** I am familiar with it.

23 **Q.** So, for example, if I'm Spotify, I'm -- well, I'm not
24 Spotify. I'm -- say I'm a developer of Spotify and I want the
25 Spotify app to be one of the top results a user sees when they

1 search, I can try to bid on a key word like "music," for
2 example?

3 **A.** I could not speak to the direct key words you could bid
4 on.

5 **Q.** Okay. So you don't know if "music" is one?

6 **A.** I've never bid on any key words outside of games
7 personally.

8 **Q.** Okay. So are you familiar with whether you can bid on
9 Spotify, the word?

10 **A.** I am unfamiliar.

11 **Q.** And if Spotify were available to bid and Spotify didn't
12 pay for that ad, something else would come up ahead of Spotify
13 in the search, right?

14 **A.** I could not say.

15 **Q.** You don't know how that works when you bid and you buy an
16 ad?

17 **A.** We keep those teams very separate.

18 **Q.** Have you done any searches ever on the App Store?

19 **A.** I have.

20 **Q.** And when you do that, do you notice sometimes you see an
21 ad-sponsored link come up before the natural search results?

22 **A.** I do.

23 **Q.** Okay. Do you have an understanding that that's the result
24 of paid search?

25 **A.** I do.

1 Q. Okay. So if a paid search has happened for a key word,
2 that result is going to appear first before natural organic
3 search results, right?

4 MR. SRINIVASAN: Objection, foundation.

5 THE COURT: It's -- well, sustained. If you want to
6 spend your time, he's -- you can lay foundation if you want.

7 BY MS. MOSKOWITZ:

8 Q. Did you look for Candy Crush in connection with creating
9 your video?

10 A. I did not.

11 Q. Would it surprise you if Pandora came up first in a search
12 for Spotify on the App Store?

13 A. I would not be surprised.

14 Q. Cause of paid apps -- paid ads. Excuse me.

15 A. In the paid section, yes, but it could also come up
16 organically based on being relevant.

17 Q. But if an ad was paid for, that's going to come up first.

18 A. I could not tell you with certainty.

19 THE COURT: Well, isn't that the point, that the ads
20 come up first?

21 MS. MOSKOWITZ: I agree. I didn't think it was going
22 to be disputed. But I'll move on.

23 THE WITNESS: There's occasions where ads don't show
24 at all.

25 THE COURT: If -- if the term is not purchased, then

1 it won't come up at all?

2 **THE WITNESS:** Correct.

3 **THE COURT:** But if it's purchased, isn't that the
4 point of paying the money?

5 **THE WITNESS:** I believe there's -- there's more to it
6 than just bidding on the key words as well. But again I'm not
7 on the ads team. I just have my historical knowledge of being
8 a buyer of those ads when I was a developer.

9 **THE COURT:** Okay.

10 **BY MS. MOSKOWITZ:**

11 **Q.** Apple benefited substantially from having Fortnite on iOS,
12 right?

13 **A.** Correct.

14 **Q.** And we talked about some numbers that are at least a
15 hundred million dollars in revenue to Apple?

16 **A.** Correct.

17 **Q.** And in fact, Apple Music also benefited at times from
18 Fortnite on iOS, right?

19 **A.** Yes.

20 **Q.** And Apple Music was involved, for example, in the
21 Marshmello concert?

22 **A.** Correct.

23 **Q.** And you referred to billboards. That was an example of
24 Apple taking out a billboard, right?

25 **A.** Correct.

1 Q. And Apple Music was featured prominently in that
2 billboard, right?

3 A. Correct.

4 Q. And it was Apple's idea to seek out the promotion for the
5 DJ Marshmello concert with Apple Music, right?

6 A. It was a collaboration. I could not say where the idea
7 originated.

8 Q. If Matt Fischer testified that it was his idea, would you
9 have any basis to disagree with that?

10 A. I would not.

11 Q. And Apple -- you actually asked Epic if they could support
12 Apple Music during the Travis Scott concert on Fortnite,
13 right?

14 A. I'm sorry. Could you repeat that?

15 Q. You asked Epic to support Apple Music for the Travis Scott
16 concert that happened on Fortnite, right?

17 A. I believe I asked if there was another collaboration
18 possible.

19 Q. Right. You -- you approached Epic.

20 A. I believe so.

21 Q. If you could please turn to PX -- actually, give me one
22 moment. I'll just ask a couple questions first.

23 Sorry? Oh.

24 You also asked Epic a number of times for exclusive
25 Fortnite content for iOS, right?

1 **A.** Correct.

2 **Q.** You asked for exclusive skins, for example?

3 **A.** Outfits.

4 **Q.** Outfits. Okay.

5 You suggested one that could look like Steve Jobs even.

6 **A.** I did not suggest that.

7 **Q.** You didn't suggest that they do the Innovator that looks
8 like Steve Jobs?

9 **A.** That came from a conversation that we had had prior.

10 **Q.** Did you -- did you suggest it?

11 **A.** I may have followed up on that, but it was not my idea.

12 **Q.** Okay. Whose idea was it?

13 **A.** I could not recall. I believe it was somebody from Epic.

14 **Q.** Okay. And you asked them to do it and you suggested that
15 Mr. Schiller would hate it so much.

16 **A.** That is true.

17 **Q.** So why don't you -- why don't we move on.

18 There was also something called the Rogue Agent Starter
19 Pack. Do you remember that?

20 **A.** I do.

21 **Q.** And that was a bundle that consisted of both consumable
22 and non-consumable goods for Fortnite?

23 **A.** Correct.

24 **Q.** Okay.

25 And that made a lot of money as well, right?

1 **A.** It made a fair amount of revenue, correct.

2 **Q.** And that revenue was 30 percent to Apple, right?

3 **A.** Correct.

4 **Q.** And do you recall there had been a time where Apple did
5 not allow bundles like that under its guidelines?

6 **A.** Consumable and non-consumables combined, correct.

7 **Q.** And Apple changed its policy and allowed that bundle on.

8 **A.** It was actually an adaptation.

9 **Q.** It changed the guideline.

10 **A.** So we allowed for consumables and non-consumables to be
11 bundled in a consumable so that there couldn't be any chance
12 of fraud. It was to protect developers.

13 **Q.** So the Rogue Agent Pack was previously not allowed and
14 then became allowed.

15 **A.** So when we make a change, we make that change for all
16 developers. We don't have any exceptions to app review.

17 **Q.** Rogue Agent Pack was previously not allowed and then
18 became allowed.

19 **A.** So a developer may spearhead a change. In this scen- --
20 (Simultaneous colloquy.)

21 **BY MS. MOSKOWITZ:**

22 **Q.** I'm not asking who caused the change. I'm asking just the
23 fact that the Rogue Agent Starter Pack was previously not
24 allowed and then became allowed.

25 **A.** Not the Rogue Agent Pack, incorrect.

1 Q. The Starter Pack?

2 A. Correct.

3 Q. Okay. But packs of consumables and non-consumables
4 previously were not allowed and then became allowed.

5 A. Correct.

6 THE COURT: When was that? When?

7 THE WITNESS: Oh, I'm sorry, Your Honor. I believe
8 it was shortly after Fortnite launched which would have been
9 May of 2018.

10 THE COURT: Okay.

11 THE WITNESS: I'm sorry. March of 2018.

12 BY MS. MOSKOWITZ:

13 Q. Why don't we go ahead and take a look at PX2125.

14 A. (Reviewing document.)

15 Okay.

16 Q. Is this what we were just talking about with respect to
17 Starter Pack?

18 A. Correct.

19 Q. Okay. And the Starter Pack, this references in here that
20 it had been pulled from the App Store or from the app?

21 A. Correct.

22 Q. And in the time it was live, it had accounted for
23 33 percent of revenue and 58 percent of transactions?

24 A. Correct.

25 Q. And in three days alone, it generated \$1.13 million in

1 billings?

2 **A.** Correct.

3 **Q.** And this was in April. There was a discussion here in
4 April 2018.

5 **A.** Correct.

6 **THE WITNESS:** So, I'm sorry, Your Honor, it was April
7 or May. My apologies.

8 **MS. MOSKOWITZ:** Your Honor, I'll offer PX2125 into
9 evidence.

10 **MR. SRINIVASAN:** No objection, Your Honor.

11 **THE COURT:** Admitted.

12 (Plaintiff's Exhibit PX2125 received in evidence)

13 **BY MS. MOSKOWITZ:**

14 **Q.** And so the Rogue Agent Pack came about in December of
15 2018?

16 **A.** I believe so, yes.

17 **Q.** Okay.

18 **A.** But actually the Rogue Agent Pack was a prior pack
19 available on Fortnite and other platforms. It first was
20 available on the App Store in December of 2018.

21 **Q.** And do you recall that it was available on iOS for a
22 couple of days and was pulled?

23 **A.** I don't recall.

24 **Q.** Okay.

25 All right. Why don't we just look at DX, which is in your

1 white binder, DX4243.

2 **A.** (Reviewing document.)

3 Okay. I'm there.

4 **Q.** In the bottom of the page -- first page there, there's
5 some bullets about the Rogue Agent Pack. Do you see that?

6 **A.** I do.

7 **Q.** And the third bullet says the pack was previously
8 available back in March but only ran for under two days before
9 app review had them pull it?

10 **A.** Yes.

11 **Q.** Okay. That's about the Rogue Agent Pack?

12 **A.** (Reviewing document.)

13 I believe so, yes.

14 **Q.** Okay.

15 And so in that time, it generated slightly over 1 million
16 in billings. See on the next page.

17 **A.** (Reviewing document.)

18 Yes. So I believe we're conflating Starter Pack -- or I'm
19 conflating Starter Pack with Rogue Agent in some scenarios. I
20 apologize.

21 **Q.** So there's some discussion in here about how Rogue Agent
22 coming back in December on iOS could drive substantial
23 conversion from nonpayers to payers, right?

24 **A.** Correct.

25 **Q.** And that's not just for Fortnite you're saying, but

1 potential -- potentially total App Store NTP, right?

2 A. Correct.

3 Q. Is that "new to pay"?

4 A. New to paying.

5 Q. And so you had expectation that this would be a big
6 revenue driver for Apple, right?

7 A. And Epic.

8 Q. And Apple.

9 A. Correct, mutually beneficial.

10 Q. Apple asked for Rogue Agent to be exclusive, right?

11 A. We did.

12 Q. Switching gears. Just going to jump around a bit. I
13 apologize in advance.

14 If you could turn to PX2362 in your binder, the nonwhite
15 binder.

16 A. (Reviewing document.)

17 Q. Also known as black binder.

18 A. (Reviewing document.)

19 I'm sorry 2362?

20 Q. Correct.

21 THE COURT: You don't want 4243 in?

22 MS. MOSKOWITZ: No, thank you, Your Honor.

23 THE WITNESS: (Reviewing document.)

24 Okay.

25

1 **BY MS. MOSKOWITZ:**

2 **Q.** This is an email chain from November 14, 2009. Do you see
3 that?

4 **A.** I do.

5 **Q.** And you're copied?

6 **A.** I am.

7 **MS. MOSKOWITZ:** Your Honor, I move PX2362 into
8 evidence.

9 **MR. SRINIVASAN:** No objection, Your Honor.

10 **THE COURT:** Admitted.

11 (Plaintiff's Exhibit PX2362 received in evidence)

12 **BY MS. MOSKOWITZ:**

13 **Q.** Do you recognize this email chain?

14 **A.** I do.

15 **Q.** And what was going on here was Epic was requesting certain
16 details on payment processing. Do you recall that?

17 **A.** Yes.

18 **Q.** And Apple -- there was discussion within Apple as to
19 whether it was willing to provide certain aspects of the
20 requested information, right?

21 **A.** Correct.

22 **Q.** And it shows that at least as of this time, two weeks had
23 gone by without responding to Epic's request.

24 **A.** (Reviewing document.)

25 Let me just review the dates.

1 Q. Sure. I'll point you to it. The first email in the chain
2 which is at the end is November 1, 2019 [sic].

3 A. Correct.

4 Q. Do you see that?

5 And as of November 14th, there was still debate going on
6 as to whether and to what extent Apple would respond?

7 A. Yes. So November 5th, a gentle reminder, and then
8 November 12th, a not so gentle reminder. Yes.

9 Q. November 14th, internal debate continues as to whether and
10 to what extent to provide information?

11 A. Correct.

12 Q. All right. Can you please turn to PX634.

13 A. (Reviewing document.)

14 Okay.

15 Q. All right.

16 Do you recognize PX634 as a March 12th, 2020 email --

17 A. Correct.

18 Q. -- on which you're copied?

19 A. I am.

20 Q. Okay. The subject is "Epic Games Tear Sheet for Sussman
21 Call"?

22 A. Correct.

23 MS. MOSKOWITZ: Your Honor, I offer PX634 into
24 evidence.

25 MR. SRINIVASAN: No objections, Your Honor.

1 **THE COURT:** It's admitted.

2 (Plaintiff's Exhibit PX634 received in evidence)

3 **MS. MOSKOWITZ:** Thank you.

4 Two minutes-ish.

5 **THE COURT:** Two. Yes.

6 **MS. MOSKOWITZ:** Thank you.

7 **Q.** A tear sheet is a snapshot of business to date with a
8 developer that Apple uses to prepare employees at the director
9 level for a call with the developer, right?

10 **A.** Correct. It's not just business to date. It can be that
11 quarter, it can be variations of it. Just have bullet points
12 of updates and other news that they need to know.

13 **Q.** Okay. In the bottom right-hand corner, there's a chart
14 labeled "Fortnite Attribution Sources LTD," right?

15 **A.** Yes.

16 **Q.** Okay. And we had a bit of debate at our time together at
17 our deposition about whether that was "launch to date" or
18 "live to date," but same idea, right?

19 **A.** Correct.

20 **Q.** Okay.

21 And this is reporting that a 115 million downloads of
22 Fortnite on iOS from launch through March 2020 occurred,
23 right?

24 **A.** (Reviewing document.)

25 **Q.** On the bottom there.

1 **A.** Correct.

2 **Q.** And of those, 79 million were the result of search, right?

3 **A.** Correct.

4 **Q.** And by search, we mean someone going onto the App Store
5 and typing and searching for Fortnite itself, right?

6 **A.** Potentially after watching an ad or other --

7 **Q.** Sir?

8 **A.** -- type of media --

9 **Q.** Sir?

10 **A.** -- so attribution is complicated, but, yes, that is
11 correct.

12 **Q.** Search. What's being reported in that number means --
13 were the result of someone going into the App Store and
14 searching for Fortnite, right?

15 **A.** Correct.

16 **Q.** So 69 percent of all of the iOS downloads in that period
17 were from users going to the App Store and typing in Fortnite
18 and then downloading it?

19 **A.** Correct.

20 **Q.** And it also refers to some numbers associated with the
21 games tab, right?

22 **A.** Correct.

23 **Q.** But you can't say how that's actually calculated, right?

24 **A.** How the install from the games tab was calculated?

25 **Q.** Right.

1 **A.** Again, there could be --

2 **Q.** Do you know? I'm asking do you know?

3 **A.** It is a click to install. That is how we would calculate
4 that.

5 **Q.** Do you recall not knowing that at your deposition?

6 **A.** So how we're attributing or how we're calculating?

7 Because I believe you asked how I attributed --

8 (Simultaneous colloquy.)

9 **BY MS. MOSKOWITZ:**

10 **Q.** Let's try again. Let's try again.

11 Is that -- is it your testimony that that number there for
12 games tab is a result of someone clicking through the games
13 tab that was featuring Fortnite at a given time? Yes or no?

14 **A.** That would -- that would be how we determine the install
15 on the games tab but not the total percentage that came from
16 any specific tab per se.

17 **Q.** All right.

18 You don't know, though, how that number was generated.

19 **A.** I could not tell you how Mr. Micono generated this -- this
20 number.

21 **Q.** Okay. And the same is true for the today tab, you don't
22 know specifically how that was calculated?

23 **A.** I could not tell you how.

24 **Q.** And the referrals number, that 7 million, 6 percent, those
25 are downloads that explicitly came from outside of the App

1 Store, right?

2 **A.** For instance, ads that Fortnite could have run.

3 **Q.** Right.

4 **A.** Or Apple could have run.

5 **Q.** Right. You can't tell, though, whether it was an
6 Epic-owned channel or an Apple-owned channel that resulted in
7 those referrals?

8 **A.** I could not.

9 **THE COURT:** Is now a good time?

10 **MS. MOSKOWITZ:** Yes. Yes, Your Honor.

11 **THE COURT:** All right.

12 You are instructed, Mr. Schmid, not to have any
13 discussions with your attorneys or any party relative to your
14 examination during the break. All right?

15 We'll stand in recess for 20 minutes, which brings to us
16 10:37.

17 **MS. MOSKOWITZ:** Thank you.

18 **THE WITNESS:** Thank you.

19 **MR. SRINIVASAN:** Thank you, Your Honor.

20 (Recess taken at 10:17 A.M.)

21 (Continued next page; nothing omitted.)

22

23

24

25

(Proceedings resumed at 10:37 a.m.)

THE CLERK: Remain seated. Court is in session.

Come to order.

THE COURT: Okay. We are back on the record. The record will reflect that the parties are present. The witness is on the stand.

Ms. Moskowitz, you may proceed.

MS. MOSKOWITZ: Thank you, Your Honor.

(**MICHAEL SCHMID**, called as a witness for the Defendant, having been previously duly sworn, testified as follows:)

CROSS-EXAMINATION (Resumed)

BY MS. MOSKOWITZ:

Q. Just going back to this engineering issue with iOS 12.

Do you remember we talked about that?

A. Yes.

Q. If you could turn -- I believe there should be some documents in your binder at the end in a pocket. PX856. Let me know if you can get to that.

A. Yes.

Q. And this is an email chain from February of 2019 with the subject line "Hot iOS 12 Memory Accounting"?

A. Yes.

MS. MOSKOWITZ: Your Honor, I offer PX856.

MR. SRINIVASAN: No objection, Your Honor.

1 **THE COURT:** 856 is admitted.

2 (Plaintiff's Exhibit 856 received in evidence)

3 **MS. MOSKOWITZ:** Thank you, Your Honor.

4 **BY MS. MOSKOWITZ:**

5 **Q.** Mr. Schmid, if you could turn to the second page there.

6 There's an email that discusses some background on the issue.

7 Do you see that?

8 **A.** I see that.

9 **Q.** And it discusses what iOS 11 -- the allocations we were

10 discussing and some issues with iOS 12, right?

11 **A.** Correct.

12 **Q.** And these are issues that are -- were inherent in iOS

13 12, right?

14 **A.** I wouldn't call it an issue. It was just a change.

15 **Q.** Okay. A change that created some issues?

16 **A.** Correct.

17 **Q.** If you could turn then to PX452. It also should be in the

18 same location.

19 **A.** Yes.

20 **Q.** Okay. And this is an email chain from March 3, 2020.

21 Do you see that?

22 **A.** Correct.

23 **MS. MOSKOWITZ:** Your Honor, I offer PX452.

24 **MR. SRINIVASAN:** No objection to the document, Your

25 Honor.

1 **THE COURT:** Admitted.

2 (Plaintiff's Exhibit 452 received in evidence)

3 **MS. MOSKOWITZ:** Thank you.

4 **BY MS. MOSKOWITZ:**

5 **Q.** And this is -- if you go to the second email down on the
6 first page, there's an email to Mark Grinn, one of your
7 colleagues, right?

8 **A.** Correct.

9 **Q.** G-R-I-N-N.

10 It refers to the engineering work that's being done on the
11 same issue, right?

12 **A.** Yes.

13 **Q.** And it says that there's one full-time engineer working at
14 Apple, right?

15 **A.** Yes.

16 **Q.** And eight full-time engineers working at Epic on the
17 problem, right?

18 **A.** Correct.

19 **Q.** You talked about app review that *Fortnite* went through --
20 well, all developers went through, *but Fortnite* went through
21 when it was on iOS, right?

22 **A.** The app review process?

23 **Q.** Yes.

24 **A.** Yes.

25 **Q.** And every build for every app has to go through app

1 review?

2 **A.** Every binary change has to go through app review.

3 **Q.** And that's even if it's a small tweak, it still has to go
4 through?

5 **A.** If it is a change to the binary, it must go through app
6 review.

7 **Q.** You testified on direct that Apple's app review team
8 reviewed *Fortnite* updates, I think you said, 200 times?

9 **A.** Correct.

10 **Q.** But you remember at your deposition you couldn't tell me
11 how many times *Fortnite* had been reviewed, right?

12 **A.** Correct.

13 **Q.** That is something that comes from a back-end system that
14 you don't even know who owns, right?

15 **A.** So --

16 **Q.** Do you know who owns the system?

17 **A.** I don't know who owns the system.

18 **Q.** And that information comes from a back-end system, right?

19 **A.** That information likely exists in multiple places.

20 **Q.** Not in your head, right?

21 **A.** It does not just exist in my head.

22 **Q.** Does it exist at all in your head until you got it from
23 somewhere else?

24 **A.** I had to receive that information from somewhere else.

25 **Q.** The app review process can last up to 48 hours, right?

1 **A.** Yes.

2 **Q.** And after an approval or rejection from the app review
3 process, an app then has to get released to the propagation
4 process, right?

5 **A.** Yes.

6 **Q.** So just -- I just want to make sure we are clear.
7 So app review happens, and then separate and apart from
8 app review, this thing called propagation happens.

9 **A.** Correct.

10 **Q.** And propagation can take up to 24 hours, right?

11 **A.** That is our SLA.

12 **Q.** And "SLA" is service-level agreement?

13 **A.** Correct.

14 **Q.** And that -- basically, what you mean by that is, that's
15 the standard time that you should tell developers to expect?

16 **A.** Correct.

17 **Q.** And so adding together the app review process and the
18 propagation process, you can be expected, if you are a
19 developer, to wait an average of 72 hours between submitting a
20 build and getting it out to the iOS users.

21 **A.** For planning purposes, 72 hours would be prudent, correct.

22 **Q.** And during those 72 hours, up to, until the process is
23 complete, the app or the update will not be available to iOS
24 users at large, right?

25 **A.** Until it has been approven [sic] and propagated, correct.

1 Q. You would disagree if someone said that app review should
2 only be expedited in extenuating circumstances. You would
3 disagree with that statement, right?

4 A. I would not disagree with that statement.

5 Q. Okay. So you would use that word?

6 A. There's more than one reason, but extenuating
7 circumstances would certainly be a reason in which to expedite
8 app review.

9 Q. Okay.

10 MS. MOSKOWITZ: Your Honor, if you could please turn
11 to 153, lines 12 through -- well, it goes on to 154:3, but I
12 think the relevant language is through 18.

13 THE COURT: Okay. Go ahead.

14 BY MS. MOSKOWITZ:

15 Q. Mr. Schmid, at your deposition, you were asked the
16 following question and gave the following answer:

17 "Question: Is it your general understanding,
18 separate from Epic and *Fortnite* then, that developers
19 should only be making expedited requests in
20 extenuating circumstances?

21 "Answer: I wouldn't use that language particularly,
22 especially nowadays."

23 And you go on, correct?

24 THE COURT: You have to read the whole thing.

25 MS. MOSKOWITZ: You want me to read the whole thing?

1 **BY MS. MOSKOWITZ:**

2 **Q.** (Reading)

3 "I would suggest that if there is something along the
4 lines of a critical bug fix or something that is
5 impacting users, it is very important that we do
6 offer them that expedited option, again, at the
7 benefit of our users. But we don't have any firm
8 criteria in which I'm aware of that would say, like,
9 only do it, you know, in certain circumstances, such
10 as X, Y, and Z, and lay it out specifically. It is
11 very much at the discretion of developers when to ask
12 for such an expedite specifically."

13 Did I read that correctly?

14 **A.** You did.

15 **Q.** And you cannot recall a single instance where you refused
16 to pass along an expedite request from any developer for app
17 review, right?

18 **A.** I cannot recall an instance in which I would refuse to
19 pass along that request, or at least make that request known.

20 **Q.** You recognize Epic's need to sync *Fortnite* releases across
21 multiple platforms, right?

22 **A.** Yes.

23 **Q.** You understand, of course, that *Fortnite* is a
24 cross-platform game?

25 **A.** Yes.

1 Q. And you understand that it was highly important to Epic to
2 have *Fortnite* content be available across all of its platforms
3 simultaneously?

4 A. Yes.

5 Q. And you understood that part of a model -- part of the
6 model for *Fortnite* is that there's frequent releases of new
7 versions of *Fortnite*, right?

8 A. Yes.

9 Q. And you understood specifically with respect to those
10 releases and because *Fortnite* is available on multiple
11 platforms, it is important for Epic to time the releases on
12 each platform to be synchronized.

13 A. Correct.

14 Q. And the propagation process following app review is the
15 process it takes for an app to basically get live and out to
16 iOS users.

17 A. Correct.

18 Q. So if you could please turn to PX625.

19 THE COURT: Can you hold on just a moment?

20 MS. MOSKOWITZ: Sure.

21 (Discussion off the record.)

22 MS. MOSKOWITZ: Testing?

23 THE COURT: Perfect. All right. Thank you. Let's
24 proceed.

25

1 **BY MS. MOSKOWITZ:**

2 **Q.** Mr. Schmid, if you could turn to PX625 in your binder.

3 **A.** I'm there.

4 **Q.** This is an email between you and Mr. Dobrin April 25,
5 2019.

6 Do you see that?

7 **A.** Correct.

8 **MS. MOSKOWITZ:** Your Honor, I offer PX625.

9 **MR. SRINIVASAN:** No objection, Your Honor.

10 **THE COURT:** Admitted.

11 (Plaintiff's Exhibit 625 received in evidence)

12 **BY MS. MOSKOWITZ:**

13 **Q.** This is an email discussing a *Fortnite* release and
14 propagation issues with respect thereto, right?

15 **A.** Correct.

16 **Q.** And Mr. Dobrin makes a number of observations about
17 Apple's propagation system in here, right? Second email from
18 the top.

19 **A.** Say one observation.

20 **Q.** He says here, "I can't believe we are relying on an
21 indexer to push data live in 2019," right?

22 **A.** Yes.

23 **Q.** And he says, "You can keep pestering engineering on the
24 shortcomings on the indexer system," right?

25 **A.** Yes.

1 Q. And you wrote back:

2 "Agreed! If we want more games to treat us as a
3 legitimate games platform, we've got to move to a
4 more reasonable system with a shorter SLA, at least
5 in line with the other major platforms."

6 Do you see that?

7 A. I do.

8 Q. And, again, "SLA" was referring to the time it takes
9 between submission and sort of getting it out to users.

10 A. The maximum amount of time it should take.

11 Q. You thought it should be shorter?

12 A. Well, the SLA is 24 hours, but often propagation would
13 happen within 30 minutes.

14 Q. But it often didn't, right?

15 A. Not often.

16 Q. You are aware that it took -- it took time for Epic's
17 *Fortnite* releases to be propagated, right?

18 A. Most were propagated quite quickly.

19 Q. Epic complained from time to time that there were issues
20 with propagation, right?

21 A. Yes.

22 Q. Consoles propagated *Fortnite* faster than Apple did.

23 A. Yes. They have many less apps and games.

24 Q. And they could propagate in seconds or minutes at worst?

25 A. Because they are only propagating one thing per day.

1 Q. Sir --

2 A. Yes?

3 Q. -- they could propagate in seconds or minutes at worst,
4 right?

5 A. I'm sorry. Absolutely.

6 Q. Thank you.

7 And because of propagation differences, sometimes Epic had
8 to decide whether to offer the update across all platforms or
9 wait for Apple.

10 A. Correct.

11 MS. MOSKOWITZ: Your Honor, I believe I can pass the
12 witness. Thank you.

13 THE COURT: Redirect.

14 **REDIRECT EXAMINATION**

15 **BY MR. SRINIVASAN:**

16 Q. Mr. Schmid, I would like to go back to those two videos we
17 showed, the videos that you recorded.

18 Do you recall those?

19 A. Yes.

20 Q. Okay. Did you edit those videos in any way?

21 A. No.

22 Q. In other words, can you tell us from -- well, from when
23 you pushed "Record" to when you pushed "Stop," was there
24 anything you did in between there?

25 A. I did not.

1 Q. Okay. And is that the case for both of those videos?

2 A. Correct.

3 Q. Now, I think you testified on cross-examination that you
4 took a step, I believe, on the App Store before you started
5 one of those videos.

6 Do you recall what that step was?

7 A. Took a step on the App Store?

8 Q. I think counsel said, "Did you do something before you
9 started recording?"

10 Do you recall that you testified that you did something
11 before you started recording on the App Store?

12 A. I logged in to the games, but that was not on the App
13 Store. That was within the game, specifically within Candy
14 Crush Hearthstone. I was already logged in.

15 Q. Okay. So you logged in to the game, the native app; is
16 that right?

17 A. Correct.

18 Q. That's the only thing that you did before you recorded in
19 that one instance?

20 A. Correct.

21 Q. Okay. No other editing or speeding up that you did?

22 A. No.

23 MR. SRINIVASAN: Your Honor, we would actually like
24 to move in those videos.

25 THE COURT: Okay.

1 **MS. MOSKOWITZ:** Objection. Those are demonstratives.

2 **THE COURT:** Did I allow yours, Ms. Moskowitz?

3 **MS. MOSKOWITZ:** I did not offer my demonstratives,
4 Your Honor.

5 **THE COURT:** Have I allowed any videos from either
6 side?

7 **MS. MOSKOWITZ:** Not that I am aware of, Your Honor.
8 There was one -- Your Honor, there was one commercial that had
9 aired that we did offer of the *Star Wars* one. But that wasn't
10 a demonstrative, that was an exhibit that we had offered into
11 evidence.

12 **MR. DOREN:** Your Honor, there have been a number of
13 videos admitted into evidence as recently as yesterday, which
14 was Mr. Sweeney presenting at WWC14, and then there were the
15 trailers created by Epic to -- for *Creative Mayhem* and the
16 original *Battle Royale Moon* trailer, as well, among others.

17 **MS. MOSKOWITZ:** Your Honor, I think the distinction
18 is that the documents -- the videos, excuse me, that were
19 offered and entered into evidence were actually pre-existing,
20 not made for litigation purposes. Those were pre-existing
21 facts and statements that could be entered.

22 **THE COURT:** I don't think that we recorded Mr. Evans'
23 demonstration. So, to be equal on both sides, I'm not going
24 to allow you to do it. I'm sure some Court of Appeal law
25 clerk will try to replicate it themselves, and that will be

1 fine.

2 **MR. SRINIVASAN:** Thank you, Your Honor.

3 **BY MR. SRINIVASAN:**

4 **Q.** Turning back to the demonstrative of *Candy Crush* that
5 counsel walked you through.

6 Do you recall that?

7 **A.** Yes.

8 **Q.** And do you recall that there were some various steps that
9 they asked you about in that examination?

10 **A.** Yes.

11 **Q.** Are those steps that -- would you -- are those steps the
12 type of steps that you might have to take the first time you
13 create an account for a particular game?

14 **A.** Yes. But, again, this is at the developer's discretion.
15 So in the instance provided, we do require that if you are
16 offering a third-party log-in, like Facebook log-in or another
17 social media log-in, that you must also add "Sign in with
18 Apple" as a service to our users to give them a
19 privacy-friendly option when they are signing up for an
20 account with any game or app. However, at that point, then it
21 is the developer's choice whether to offer that log-in option,
22 as well, on their website and tie those experiences together.

23 In this circumstance, King chose to not use any
24 third-party log-in system on their website and to only offer
25 the king.com account, which is absolutely their choice.

1 Q. Okay. And is "Sign in with Apple," which you just
2 mentioned came up in your cross-examination, is that something
3 Apple makes available to developers, any developer?

4 A. Yes, on web or native.

5 Q. Is there any charge for "Sign in with" -- the use of "Sign
6 in with Apple"?

7 A. There is not.

8 Q. Do you know when the "Sign in with Apple" program was
9 instituted?

10 A. I cannot give you an exact date. It was over one year
11 ago.

12 Q. Okay. So within roughly about a year ago?

13 A. It was definitely over one year ago, possibly two years
14 ago.

15 Q. Okay. With respect to the -- again, the steps that you
16 were taking, once a user initiates their log-in and password
17 for a website or the native app, is that something they have
18 to do every single time subsequently?

19 MS. MOSKOWITZ: Objection. Foundation.

20 THE COURT: Overruled.

21 THE WITNESS: So a user can choose oftentimes to
22 remember their log-in and password. Most developers will give
23 you that option on their website.

24 On the native app, it pretty much is always saved. There
25 is occasions where you may prefer to log in each time. And

1 then also on the website, bounce back to that we have *Keychain*
2 and other apps available to allow you to save passwords if you
3 prefer to log in and, you know, use face I.D., for instance.

4 **BY MR. SRINIVASAN:**

5 **Q.** And in your specific case -- you are a gamer -- is it your
6 practice to save your passwords so you don't have to type them
7 in again?

8 **A.** Yes.

9 **Q.** And in your experience in the gaming industry, is it your
10 understanding that gamers typically keep their passwords
11 saved?

12 **A.** Yes.

13 **Q.** I want to turn to Exhibit 625, which I think was the
14 last -- PX Exhibit, 625, which was in the black binder,
15 Mr. Schmid, one of the last ones counsel asked you about.

16 Do you have it?

17 **A.** You said 625?

18 **Q.** It is on your screen.

19 **A.** Okay. Yes.

20 **Q.** And at the top of Exhibit 625 -- well, first of all, let
21 me ask you this: Do you believe that the iOS platform is a
22 legitimate games platform?

23 **A.** I do.

24 **Q.** Okay. And can you tell us what you meant at the email on
25 the top of Exhibit 625 when you were discussing this issue?

1 **A.** So one of my jobs is also to work with game developers
2 that aren't on the platform. Sometimes this is developers
3 that have made console or PC games for years. Oftentimes it
4 is an independent developer that's only had a game on Steam,
5 and they are used to a certain experience on the platforms
6 they exist on.

7 So what I meant by this was, if we want more game
8 developers to see iOS as a viable and really legitimate
9 gaming platform, these are the kind of things that we could
10 change to improve the experience to get there.

11 **Q.** And what specific thing were you talking about here?

12 **A.** In this case, I was talking about the propagation process.

13 There is also a lot to be said about how much more Apple
14 is processing through that propagation pipeline than any other
15 platform. So we have many more apps, and it is just a much,
16 much bigger platform than the consoles or even, you know, a
17 direct-to-PC store would have.

18 **Q.** So is this propagation issue at all related to the
19 capabilities or the technology or the graphics of the phone?

20 **A.** No.

21 **MR. SRINIVASAN:** No further questions, Your Honor.

22 **MS. MOSKOWITZ:** Nothing further, Your Honor.

23 **EXAMINATION**

24 **THE COURT:** Okay. So there's been a lot of
25 discussion about gamers in this trial.

1 Do you, as -- in your role, has Apple done any studies or
2 profiles in terms of gamers as a separate and distinct
3 customer base?

4 **THE WITNESS:** Yes, Your Honor.

5 **THE COURT:** And can you tell me, in terms of the
6 amount of money that developers and Apple are making on gamers
7 as a distinct customer base, what those numbers look like, I
8 mean, in terms of -- yeah, how is that base different from
9 anything -- anybody else who is using the iPhone?

10 **THE WITNESS:** Sure.

11 So I think this is a very complicated question, but
12 something that is very important and I'm highly interested in.

13 So we look at revenue derived from games, you know, it is
14 very, very big. It's a tremendous part of the platform.
15 It's, you know, the billions of dollars that -- generated that
16 we are -- that is mutually beneficial to Apple and our game
17 developers.

18 When you look at the title "gamer," which has some kind of
19 negative associations with it at times, and oftentimes those
20 are validated by things that we see in the gaming ecosystem, I
21 think that is where I get uncomfortable determining, like,
22 what that user base is.

23 So my wife, for instance, plays *Scrabble Go* every day.
24 She has not played a PC game or console game since *Fortnite*
25 was no longer in our house, but she plays *Scrabble Go* every

1 day. Does that make her a gamer? In the traditional sense,
2 maybe not, but she plays a game every day.

3 We don't look -- at Apple, we don't look at gamers as some
4 sort of the stereotypical teenager in their basement playing
5 games. We look at gamers as people who enjoy games. They may
6 also do other things with their phone and have, you know,
7 really important jobs, or they may just be killing time on the
8 bus. That's a gamer to me. That's somebody that enjoys
9 games. It doesn't define them as a person. Like, I'm a dad,
10 but I also play games.

11 **THE COURT:** So of the entirety of that population,
12 where are the revenues coming from?

13 **THE WITNESS:** So of the entire population of app
14 users or --

15 **THE COURT:** Well, are you saying that all app users
16 are also gamers?

17 **THE WITNESS:** Certainly not.

18 **THE COURT:** Okay. So of all app users, how many
19 would you say access, or you would put in a gamer category?

20 **THE WITNESS:** I guess that truly depends on the
21 definition. If we're saying a gamer is somebody that plays a
22 game once a week and if that is what we are going to use to
23 identify it, it is a very large percentage of users.

24 I couldn't give you an exact, but I think, you know, even
25 if you look anecdotally in your life how many people have a

1 game on their phone, it's almost all the people you speak
2 with. There might be some exceptions and maybe they don't
3 play them very frequently, but...

4 **THE COURT:** Okay. So not anecdotally, then, Apple's
5 a business, developers are --

6 **THE WITNESS:** Correct, Your Honor.

7 **THE COURT:** -- you know, trying to -- you're trying
8 to make money.

9 **THE WITNESS:** Correct.

10 **THE COURT:** So in the context of revenue, what are
11 you finding? Or do you do any analysis whatsoever?

12 **THE WITNESS:** We do the analysis on the revenue from
13 games, but we don't look at the user-level activity, like what
14 does the gamer on our platform generate. We don't split our
15 users in that same way.

16 **THE COURT:** Okay. So -- and then in terms of
17 revenue, do you make a distinction or have you done any
18 analysis between what happens with in-app purchases as
19 compared to initial downloads?

20 **THE WITNESS:** So in referring -- if you are referring
21 to premium games that are purchased for a price versus in-app
22 purchase games, free-to-play games --

23 **THE COURT:** Right.

24 **THE WITNESS:** -- the vast majority would be
25 free-to-play games and the revenue derived from free-to-play

1 games. Premium games is still a business on our store, but
2 it's a much, much smaller business today than it was a decade
3 ago.

4 **THE COURT:** And how are subscriptions working into
5 that analysis?

6 **THE WITNESS:** As far as games go, there is very few
7 games that are really able to crack that subscription model.
8 I think there are certainly more than there have ever been and
9 it is continuing to grow, mostly around battle passes like
10 *Fortnite* has and other things of that nature. But it is still
11 a much smaller section than in-app purchase alone.

12 **THE COURT:** Has Apple ever done any analysis of
13 issues related to impulse purchasing?

14 **THE WITNESS:** Not that I am aware of.

15 **THE COURT:** Okay. Anything on those questions,
16 Ms. Moskowitz or Mr. Srinivasan?

17 **MS. MOSKOWITZ:** Just a --

18 **THE COURT:** He's first.

19 **MR. SRINIVASAN:** Nothing here, Your Honor.

20 **THE COURT:** All right. Ms. Moskowitz, go ahead.

21 **MS. MOSKOWITZ:** Thank you, Your Honor.

22 **RECROSS-EXAMINATION**

23 **BY MS. MOSKOWITZ:**

24 **Q.** The Court asked you a few questions, Mr. Schmid, about
25 where revenues are being generated from.

1 Is that -- do you remember those questions?

2 **A.** Correct. Yes.

3 **Q.** Do you have personal knowledge of that information or is
4 that something that you have to look up in the systems?

5 **A.** As far as like -- could you clarify?

6 **Q.** Sure. Could you tell me for any actual category of games,
7 sitting here right now, exactly how much revenue is generated?

8 **A.** Oh, per category?

9 **Q.** Sure.

10 **A.** I could not give you that off the top of my head.

11 **Q.** And vis-a-vis between games and nongame apps, as they are
12 currently categorized, you can't actually tell me any of the
13 numbers of revenue generated by those categories?

14 **A.** Off the top of my head, I would not be able to do that.

15 **Q.** And you would have to go look that up somewhere?

16 **A.** Correct.

17 **MS. MOSKOWITZ:** No further questions, Your Honor.

18 **THE COURT:** Any follow-up?

19 **MR. SRINIVASAN:** Nothing further, Your Honor.

20 **THE COURT:** Okay, sir, you are now excused. Now you
21 can listen to the news.

22 **THE WITNESS:** Thank you, Your Honor.

23 **THE COURT:** Okay. Next witness.

24 A new witness is coming in, Mr. Lo?

25 **MR. LO:** Good morning, Your Honor. Jason Lo for

1 Apple. We call as our next witness Craig Federighi.

2 **THE CLERK:** If you will remain standing, I will swear
3 you in.

4 (**Craig Federighi**, called as a witness for the Defendant,
5 having been duly sworn, testified as follows:)

6 **THE WITNESS:** I do.

7 **THE CLERK:** Please be seated.

8 **MR. LO:** Your Honor --

9 **THE CLERK:** And if you'll be sure that mic is kind of
10 under the shield.

11 **THE WITNESS:** Okay.

12 **THE CLERK:** And then please state your full name and
13 spell your last name.

14 **THE WITNESS:** My name is Craig Michael Federighi.
15 The last name is spelled F-, as in Frank, E-D-E-R-I-G-H-I.

16 **THE COURT:** Good morning, sir.

17 **THE WITNESS:** Good morning.

18 **THE COURT:** You may proceed.

19 **MR. LO:** Thank you, Your Honor.

20 May I pass up some binders to the witness and to the
21 Court?

22 **THE COURT:** Yes, you may.

23 (Pause in the proceedings.)
24
25

DIRECT EXAMINATION

BY MR. LO:

Q. Good morning, Mr. Federighi.

A. Good morning.

Q. Could you please introduce yourself, please.

A. Yes. My name is Craig Federighi. I work at Apple.

Q. All right. And what is your current position at Apple?

A. I'm the senior vice president of software engineering.

Q. Before we start talking about your work at Apple, can you give us an overview of your education and work history.

A. Sure.

I caught the computer bug when I was 10 and was sort of self-taught and did some commercial work throughout junior high and high school, and then went to UC Berkeley in computer science. I worked a little bit after that, then went back for a master's in computer science, also at UC Berkeley.

And then went -- I worked at Oracle and then eventually at NeXT Computer, which was a company founded by Steve Jobs back -- I joined as a software engineer.

We were ultimately acquired into Apple. I worked at Apple for a while and then -- as a director of engineering, ultimately, and then worked at Ariba for 10 years as a CTO before returning back to Apple in 2009.

Q. At Apple, what are your current responsibilities today?

A. Well, so I lead our software engineering organization. It

1 is a team responsible primarily for building the operating
2 systems that power Apple's products.

3 **Q.** What is an operating system?

4 **A.** Well, today the operating system is a massive piece of
5 software, hundreds of millions of lines of code, that really
6 take the raw potential that is a piece of hardware in an iPad
7 or a Mac or an iPhone and turn it into an experience, turn it
8 into the things that you are used to using, with graphics and,
9 you know, gestures and icons and built-in experiences and
10 apps. So it is kind of top to bottom, a large software stack
11 that makes the device what it is.

12 **Q.** And the people in this courtroom have heard a lot about
13 iOS and macOS already.

14 Can you tell us what those are?

15 **A.** Yes. So "iOS" refers to the operating system that
16 powers the iPhone. There is also a variant of iOS called
17 iPad OS that powers the iPad. And then macOS is the
18 operating system, of course, that powers the Mac.

19 **Q.** And does your job responsibilities entail any work on
20 either macOS or iOS?

21 **A.** Both. Yes.

22 **Q.** Okay. Do your job responsibilities cover the security of
23 macOS and iOS?

24 **A.** Yes.

25 **Q.** Okay. And at a high level, what does "security" mean for

1 you in the context of your work at Apple?

2 **A.** So I -- my organization includes a team that leads --
3 focuses particularly on -- on device security, as well as an
4 overall security architecture for our devices.

5 Security, as a discipline for us, means protecting users'
6 data and protecting their control over the device, making sure
7 that what happens on their device is what the user intended
8 and isn't being manipulated by a bad actor.

9 **Q.** At the time that iOS was developed, did macOS already
10 exist?

11 **A.** Yes, the Mac precedes iOS by a grade. Yes.

12 **Q.** And do the two operating systems share the same core
13 operating system kernel? Have you heard that phrase?

14 **A.** Oh, yes, of course. Yeah, they do.

15 So if you think of the operating system as a car or
16 something like this, you can think of the kernel maybe as the
17 engine, the low-level power plant.

18 And they do -- both of those operating systems share the
19 same kernel and apply it in somewhat different ways, just as
20 an automotive engine might end up in a car and a fighter plane
21 and a tank.

22 **Q.** And given that macOS and iOS share the same operating
23 system kernel, did the initial iOS operating system share
24 the same security mechanisms as macOS, which had preceded
25 iOS?

1 **A.** There were tremendous differences.

2 **Q.** Why was that?

3 **A.** Well, when -- and I'm going to speak -- I rejoined Apple
4 in 2009 after some of this work had already occurred. But
5 since taking over leadership of it, I certainly have -- will
6 represent all of it for the Court.

7 When we set out to create iPhone, we recognized this was a
8 kind of once-in-a-generation opportunity to take what we
9 learned in security and really build a system for the next
10 generation.

11 The fundamental computer architecture of something like
12 the Mac and its security architecture has its roots going back
13 40 years. We learned a lot with iOS.

14 And we also understood that the cell phone market was a
15 market of billions of devices. It was going to touch many
16 more people in a wide range of age groups and a wide range of
17 kind of understanding of operating a computer, and so we
18 really had to think about a security architecture that could
19 protect all of them in that kind of context.

20 **Q.** When the iPhone was first released, was it open to
21 third-party native apps?

22 **A.** No, it was not. It was -- just had built-in experiences
23 and web browsing.

24 **Q.** And so when Apple subsequently opened up the iPhone to
25 native third-party apps, do you have an understanding of

1 whether that affected the security considerations for iOS?

2 **A.** Oh, tremendously, yes.

3 We also wanted to really radically rethink people's
4 relationship with apps. When you go back to a system like the
5 Mac, downloading software was a relatively infrequent event.
6 People usually installed a handful of applications.

7 For iOS, we envisioned that users would download lots of
8 little apps to solve all kinds of problems, that they would be
9 downloading software all the time.

10 And so we wanted to make that something that users could
11 do very easily without being particularly experienced or
12 thoughtful about the security consequences of performing those
13 kinds of downloads. And so we had to engineer an end-to-end
14 system that could give customers that confidence.

15 **Q.** Okay. From the perspective of somebody who has to defend
16 iOS users against attacks, is there any kind of model that
17 you use to evaluate kind of what the attack situation looks
18 like, you know, from the perspective of the device user?

19 **A.** Sure.

20 A common way when considering security is to think about
21 the threat model, who are the threat actors, what are they
22 trying to do, what are their motivations, what are their means
23 of attack, and then consider what sort of countermeasures or
24 obstacles can be created to frustrate that attack or make that
25 attack economically inviable for them.

1 **MR. LO:** Okay. If I could ask Mr. Spalding to put up
2 Slide number 2. Thank you.

3 **BY MR. LO:**

4 **Q.** Mr. Federighi, do you recognize what is on the screen
5 right now?

6 **A.** I do.

7 **Q.** And what is the information that's being conveyed here?

8 **A.** Well, it is really getting to how an attacker often thinks
9 about the attractiveness of performing an attack. A large --
10 the largest class of attackers are fundamentally economically
11 motivated cybercriminals, and I suppose, like any business,
12 they are concerned about return on investment, how big is the
13 economic opportunity, how big is the market.

14 And so the factors that will play into the analysis of how
15 worth it is it to mount an attack against a platform has to do
16 with how many customers are there for their malware, in other
17 words, how many devices can I hope to attack; how many
18 opportunities am I going to get to mount my attack, because
19 each of those are going to give me another sort of at bat,
20 hope to create an infection and accomplish my goals; and then
21 what is the kind of value of that access, if I succeed at that
22 attack, what kind of return could I expect for doing so.

23 **Q.** Okay. And let's take these one at a time in the context
24 of in iOS devices now.

25 What does the number of devices look like as a threat

1 model consideration for a potential attacker?

2 **A.** Well, the iOS ecosystem is quite popular at this point.

3 There are well over a billion active devices out there. And

4 so from an attacker's point of view, these are -- there's a

5 large market that is very attractive to potentially attack.

6 **Q.** Okay. And then what about the number of opportunities,

7 what does that mean with respect to iOS devices?

8 **A.** Well, it essentially means how often is an attacker likely

9 to have contact with a user. In a way, iPhone users are more

10 prone to download apps by far than typical, let's say, Mac or

11 PC users.

12 The iOS app ecosystem has been so successful that, you

13 know, we have a campaign called "There's An App For That,"

14 because kind of, hey, you've got a little thing you want to

15 do, download an app. That is a very normal thing to do on

16 iOS.

17 But what that means for an attacker is potentially lots of

18 opportunities to convince someone, how about download my

19 thing. And so for iOS, that is a very large factor.

20 **Q.** Okay. And then, finally, what does the value of access

21 mean in the context of iOS devices?

22 **A.** Well, iPhones are very attractive targets. They are

23 very personal devices that are with you all the time. They

24 have some of your most personal information, of course your

25 contacts, your photos, but other things. They have cameras on

1 them and microphones. They are capable of knowing your
2 location.

3 And so they are also often -- because they are always with
4 you, they may be used as a key to get into your place of
5 business or an authentication token to unlock your bank
6 account. All of these things make access or control of these
7 devices potentially incredibly valuable to an attacker.

8 **MR. LO:** Okay. Mr. Spalding, if you can put up
9 number 3.

10 **BY MR. LO:**

11 **Q.** So we have been talking a little about the threat model
12 considerations for the iOS. Let's briefly compare that to
13 macOS, and let's take those one at a time.

14 How does the iOS threat model compare to macOS devices
15 in terms of number of devices?

16 **A.** Well, the Mac is a very successful product and I love it
17 very much, but there are well less than a tenth as many Macs
18 out there in active use than iOS devices. So from an
19 attacker's point of view, iOS is a much more attractive
20 market in ways to go after.

21 **Q.** And what about the number of opportunities for a malware
22 attacker to mount an attack on macOS versus iOS device users,
23 or the average macOS versus iOS device user?

24 **A.** Well, as I mentioned earlier, Mac users and the habit of
25 how people approach software in the Mac is much -- you know,

1 has its roots in many, many years ago, when one was -- would
2 install a handful of applications to accomplish particular
3 tasks, but then it kind of steadies out. They are not
4 downloading lots of apps all the time.

5 And Mac users are also typically much more wary about
6 downloading software. They might be on the internet, and so
7 they wonder do I really -- do I really need this app or not.

8 iOS users are accustomed to just getting apps all the
9 time, and so we see iOS users installing dramatically more
10 applications, which, again, ultimately means as an attacker,
11 if I'm trying to convince you to download that one more app, I
12 have got a good chance that you are going to be willing to do
13 that.

14 **Q.** And then, finally, what about the value of access as it
15 compares to those two classes of devices?

16 **A.** I think, certainly, there's high value to data that exists
17 on Macs as well.

18 iOS devices have an additional level of value or
19 concern, in part by nature of the fact that it is a device
20 that is always with you. And because it is always with you,
21 if someone wanted to track your location, if someone wanted to
22 have a live mic on you to capture your conversations, if they
23 wanted to get access to certain kinds of credentials and
24 tokens you use to access maybe work systems, those are likely
25 to be on your iOS device, not nearly as likely to be on the

1 Mac.

2 So, in general, the iOS is -- iOS devices are a more
3 attractive, higher-value target.

4 **Q.** Okay. Let's transition from talking about kind of the
5 incentives to attack and let's talk about the attacks
6 themselves.

7 In your work at Apple, do you -- have you gained an
8 understanding in terms of the types of attacks that may be
9 mounted against Apple device users?

10 **A.** Yes, I have.

11 **MR. LO:** Okay. And if I could ask Mr. Spalding to
12 put up number 4.

13 **BY MR. LO:**

14 **Q.** Mr. Federighi, what is on the screen right now? What
15 information is on here right now?

16 **A.** Well, this is an overview of some common sort of fan
17 varieties of attacks that are -- one sees across the computing
18 ecosystems in terms of different kinds of malware.

19 **Q.** Okay. And some of these may be more self-evident, but
20 I'll just go through them one at a time.

21 You have got up here on the upper left "scams." What's a
22 scam in the context of an app?

23 **A.** So scam is often software that's misrepresenting itself,
24 claiming to offer something that it doesn't actually deliver,
25 hey, give me this money and I will let you watch this video or

1 give you access to this discounted software, and, in fact,
2 it's really just misleading the user and taking their money
3 without giving them what they expected.

4 **Q.** Okay. What do you mean when you say "vandalism and
5 sabotage"?

6 **A.** So some software is out there really to do damage. Now,
7 this could be everything from someone who is just pulling a
8 destructive prank, maybe to get in the news or establish their
9 credibility with a certain community, but it can also be used
10 for really destructive purposes. This could be trying to take
11 out a power plant. There have been incidences of breaking
12 into systems in order to poison water, these kinds of things.

13 And so this is using the access to a computer to
14 ultimately maneuver around a network and maybe either destroy
15 the data on a computer or destroy a computer system or use the
16 computer system's controls to wreak even greater physical
17 havoc.

18 **Q.** What is "ransomware"?

19 **A.** Well, so ransomware is really, ultimately, getting someone
20 to pay money to either avoid embarrassing or confidential
21 information being released or to regain access to information
22 that an attacker has taken control of.

23 So a common scheme is to get access to a user's data --
24 maybe this is photos, maybe these are confidential
25 documents -- copy them up from the user's system up to the

1 attacker's system, and then say, oh, well, I found these
2 embarrassing details about your life. Pay me or else I'm
3 going to release them.

4 Another form of ransomware is where the attacker actually
5 has your own computer encrypt the data with a key that only
6 the attacker has, and so you can no longer access your own
7 data. Your precious photos, your critical business documents,
8 are now gone for you, and the attacker says, I have the key.
9 Pay me this much or I will destroy the key. And this is a
10 common form of ransom.

11 This has been done, certainly, broadly against
12 individuals, as well as institutions like hospitals that have
13 a really urgent need to maintain their systems and access to
14 critical information, and that is why they are a target for
15 ransom.

16 **Q.** And what is "surveillanceware"?

17 **A.** Well, so surveillanceware takes advantage of if you can
18 get deep access to a device, get the user to give you perhaps
19 access to their camera or microphone, you might listen in on
20 them. You might install what is called a keylogger to try to
21 get all the passwords you are typing or account numbers and
22 exfiltrate that information.

23 **Q.** Okay. And then, finally, what is "info stealing"?

24 **A.** Well, it is kind of like what it sounds like. It can be
25 stealing information of value.

1 A common subclass, a very popular one on Windows and
2 Android, are fake banking apps. So you might think you're
3 downloading the banking app from your bank to let you manage
4 your account. It's actually an attacker-controlled app, and
5 as you type in your account number, maybe your social security
6 number, your password to your bank, the attacker is actually
7 receiving that information and, behind the scenes, they are
8 using that information to empty out your bank account.

9 **Q.** So these are kind of the various what -- you know, what
10 happens when the attacks actually happen.

11 Are you also familiar with some of the ways in which the
12 attackers will mount the attack itself?

13 **A.** Certainly.

14 **Q.** Okay.

15 **MR. LO:** Mr. Spalding, if you could put up number 5.

16 **BY MR. LO:**

17 **Q.** And, Mr. Federighi, what do we have on the screen here?

18 **A.** Well, this is a high-level representation of the sort of
19 phases of the activity of an attacker.

20 They, of course, develop and package their malware; they
21 distribute their malware, find a way to get it to users for
22 users to download it; and then the malware, once installed and
23 run on the victim's device, goes about doing its harm.

24 **Q.** Okay. And so the "develop" part seems more self-evident,
25 an attacker sits down and writes the code.

1 So then what comes next?

2 **A.** Well, so once they developed their attack, they ultimately
3 have to decide how to package it such that they could --
4 because no one -- if you advertise something as, here is some
5 malware, do you want it, very unlikely to get too many takers
6 for that.

7 And so part of what the attacker has to do is figure out
8 how to package that malware as something they can entice
9 someone to download.

10 One thing they might do is package it as a trojan, meaning
11 take something that the user already wants. Here is a free
12 copy of Microsoft Word, of Adobe Flash Player or Photoshop,
13 and, in fact, you don't just get Photoshop, you get Photoshop
14 plus some extra malware added into it. That would be one kind
15 of packaging.

16 Another packaging would be to create some app that they
17 think they can convince someone it's highly desirable. We
18 have seen things like here is a video player to let you watch
19 free NFL games, or here is something to watch a certain kind
20 of, you know, salacious clip that they've teased you with, you
21 just need this custom player if you want to use it. And what
22 that app actually is, it may do none of those things, but what
23 it does do is deliver malware.

24 Once they have the malware that they want the user to
25 install, of course, they have to get the user interested in

1 it. They have to make that connection with the user.

2 And that gets to distribution. And the internet is just a
3 very wide-open environment for distribution, and so very often
4 they will do things like Google search results where they will
5 find something you might be looking for, you know, maybe a
6 search for "Free Adobe Photoshop," "Free Microsoft Word," and
7 here is a search result that says, you know, you can have it
8 here.

9 And where it directs you is to a web page that looks
10 legitimate, might legitimately look like the real Microsoft or
11 the real Adobe, you think you are downloading this discount
12 software, you have actually just downloaded malware.

13 They might also phish you by sending you an email looking
14 like this is a notice from Apple computer saying, you know,
15 you need to update your computer with the following thing,
16 please install this. And, again, you click a link that
17 they've made to look like it is from Apple, you download some
18 software, and you get not what you bargained for.

19 So there are many kinds of email-oriented -- it is
20 fundamentally web marketing techniques harnessing advertising
21 and marketing machinery to convince users to download
22 something different than what they thought they were getting.
23 **Q.** So let's say the malware has been written through an ad or
24 otherwise, the victim has downloaded the software onto their
25 device.

1 Is there anything else that then needs to be done for the
2 attack to be culminated?

3 **A.** Yes. So there are a number of operating defenses that
4 seek to contain bad software. And so, of course, the attacker
5 needs to make sure that they can circumvent those defenses to
6 accomplish their goal.

7 Now, if they have gotten you to download the software in
8 the first place, they have mounted -- and then to run that
9 software, they have mounted one of the critical hurdles.

10 The next thing they want to do is either exploit a bug in
11 the operating system to get around the operating system's
12 protections or very commonly fool you in a way we call social
13 engineering, fool you into giving that software the access it
14 needs.

15 So an example would be for that ransomware software, maybe
16 this app represents itself as a dating app and it says, oh, I
17 need access to your photo library so you can pick a profile
18 picture for your account on the dating app.

19 The operating system says the app has asked for access to
20 your photo library, do you want to allow that? And you say,
21 well, I guess so, I really want to use this dating app. I
22 say, okay. Well, now the operating system has allowed access.
23 The attacker software now goes through all your photos, either
24 encrypts them for ransom, exfiltrates them to the attacker's
25 site for blackmail, et cetera. So social engineering is

1 another way that they can get -- accomplish their harm.

2 Q. So we have been talking about attacks now. Let's
3 transition and talk about defense.

4 How would you describe Apple's approach to defending
5 against the various techniques and the attacks that we have
6 been talking about so far?

7 A. Well, we use the term "defense in depth" --

8 Q. Mr. Federighi, your microphone is hitting your lapel.

9 A. Oh, I'm sorry. Okay. Thank you.

10 So we use the term "defense in depth," and this means
11 providing many, many layers. Because at any given time, one
12 of those layers could be temporarily circumvented, and so you
13 want to have another layer and another layer.

14 And these layers also, in aggregate, create difficulty and
15 economic disincentive. If the attacker constantly has to
16 fight at each of these layers, it may not be worth it in time
17 if their return can't be great enough. So we try to stack up
18 many layers of defense.

19 MR. LO: Okay. And, Mr. Spalding, if you could put
20 up Slide number 7.

21 BY MR. LO:

22 Q. Mr. Federighi, do you recognize what -- some of the
23 information that is on Slide number 7 that's on the screen
24 right now?

25 A. Yeah. So this represents three broad categories of

1 defenses. And we have stacked them up here kind of to
2 represent a barrier that an attacker would have to get over to
3 accomplish their attack.

4 **Q.** Okay. Let's start from the bottom.

5 What is a "malware scan"?

6 **A.** So a malware scan is analyzing a piece of software to
7 determine whether -- typically, programmatically analyze a
8 piece of software to try to determine whether it contains
9 known malware or malware patterns that have been seen before
10 so that you can reject the software.

11 **Q.** What is referenced by "signed code"?

12 **A.** So code signing is a cryptographic technique that can be
13 used so that when you receive, let's say, a program to run,
14 you can determine whether an entity that presented it to you
15 had been in possession of a certain signing certificate that
16 someone who you trusted had granted.

17 So say Apple gives a certificate to a registered
18 developer. The developer signs the software with that
19 certificate, and when the operating system is asked to run the
20 software, it can determine, oh, this code was signed by
21 someone who had a certificate that was granted to them from
22 Apple.

23 And so that is a protection against an attacker throwing
24 random -- an untrusted entity, an unknown entity, throwing
25 some attack that had never been seen before, tries to

1 establish some level of legitimacy for the entity providing
2 software.

3 **Q.** So if a user receives code that's signed by a trusted
4 developer or a big entity, say UC Berkeley, does that
5 typically mean that the code is safe to run on your computer?

6 **A.** Unfortunately, often not. The code signature is a
7 deterrent, but code signatures, the signing certificates
8 themselves, can be stolen. They can fall into the wrong
9 hands.

10 If you look at something like some of the kinds of attacks
11 that you've seen where someone has gotten control of the
12 signing infrastructure of a given company or of an open-source
13 project and used it to sign software that was illegitimate.

14 The other problem is when you talk about a large developer
15 community -- and iOS has, you know, hundreds of thousands, a
16 million developers -- that is a lot of certificates that are
17 being granted and they're out in the environment.

18 It is difficult to, with total confidence, establish the
19 intents, motives, and authenticity of everyone who holds one
20 of those certificates. And so in practice, it is common for
21 attackers to get ahold of these certificates, even though we
22 wish they didn't have them.

23 And then once a user -- if they were to try to look and
24 say, well, I think I'm downloading from UC Berkeley; let me go
25 look at what the certificate says -- honestly, most users

1 don't bother to read that -- but if they do, attackers, of
2 course, are clever enough to make sure that the name of their
3 business sounds conformant with the entity they are trying to
4 impersonate.

5 So is it UC Berkeley? Is it Berkeley Technology Center,
6 Ltd.? Is it -- I mean, there are any number of names that to
7 a user is like, oh, this sounds right, and, in fact, it is not
8 the real entity they thought they were trusting.

9 **Q.** Got it.

10 And what is "sandboxing"?

11 **A.** So I'm using "sandboxing" here in the broadest term, in
12 that containing software to execute in the manner that the
13 operating system is attempting to authorize.

14 Now, the root of the term is thinking about, let's say,
15 children playing in a sandbox. A sandbox has a boundary to
16 it. It has a set of toys. If you're a child playing in this
17 sandbox, you don't get to reach out of the sandbox and do
18 something unsafe elsewhere, right? You are kind of contained
19 in this safe playpen to make sure you don't do anything bad.

20 Well, the operating system has many mechanisms to attempt
21 to make sure that software that is running doesn't do anything
22 that the user hasn't authorized.

23 **Q.** Does Apple use any of these mechanisms on macOS or iOS,
24 malware scanning, the signed code, and the sandboxing?

25 **A.** Yes, we do.

1 Q. Okay. And is it iOS or macOS? Which one?

2 A. So both iOS and macOS have different variants of these
3 technologies.

4 Q. There has been some testimony earlier in this case about
5 technology called address space layout randomization, ASLR.

6 Are you familiar with that?

7 A. I am.

8 Q. And what is that?

9 A. So it's one of a broad class of anti-exploitation
10 techniques that try to make it difficult for an attacker to
11 get code execution in an environment where they weren't
12 supposed to have code execution.

13 An attacker will perhaps have -- present data to a part of
14 the system by perhaps doing a buffer overrun or use-after-free
15 attacks -- sorry, these are techie phrases -- but, in essence,
16 they ultimately try to get some code when they weren't
17 supposed to run code, and what they do is have their code try
18 to do jumps into operating system routines to do their work.

19 And in order to do that, though, they need to know the
20 address of those routines. They need to know where they are
21 jumping to. And in the old days, those addresses were
22 something you could know upfront, so the attacker could put
23 that in their attack and they could say, oh, if I want to do
24 this routine, I'm going to call here.

25 Address space layout randomization says that the operating

1 system, at startup, picks a random slide for each piece of
2 operating system code so that if I try to attack your system,
3 I don't know where that address is. I could be jumping off to
4 the middle of nowhere and then the operating system says, hey,
5 something is fishy here, someone just jumped into the middle
6 of nowhere, I'm going to terminate execution.

7 So it's one of the protections to make sure that the app
8 is staying on its rails and behaving as expected.

9 **Q.** And is ASLR represented on any of these defense mechanisms
10 that we've been talking about?

11 **A.** Yeah. In the broadest terms, sandboxing is meant to
12 represent all the kinds of things, like memory protections and
13 other things, to keep the code executing according to OS
14 permissions.

15 **Q.** There's also been some testimony about mechanisms eXecute
16 Never and memory isolation.

17 Are you familiar with those mechanisms?

18 **A.** Sure.

19 **Q.** And what are those?

20 **A.** So one technique an attacker will use is to try to send
21 code down or create code on the fly to execute and then try to
22 get the system to execute it.

23 This, of course, can bypass code signing, because if what
24 the operating system is supposed to be running is only code
25 that it had seen before and that had been signed and now

1 someone tries to jump into some new code, that would be a
2 problem.

3 By having the operating system ensure that any data pages
4 that the program allocates are marked for no execution, even
5 if the attacker writes code into those pages, if they try to
6 set the CPU to execute instructions in those pages, the
7 operating system says hold on, I'm not allowed to execute on
8 that page. So it's yet another defense against a common
9 exploit.

10 **Q.** Okay. And are those represented on this slide, as well,
11 this wall?

12 **A.** Yeah. Again, in my mind, these are all part of the
13 sandboxing protections, keeping the process executing as
14 expected.

15 **Q.** Okay. And then, finally, there has been some testimony
16 about kernel integrity protection and page protection layers.

17 At a high level, what are those?

18 **A.** So we talked earlier about the kernel -- operating system
19 kernel being kind of the engine of the car. It is a
20 foundational part of the operating system. And it is the
21 kernel that is enforcing many of these protections. It is
22 enforcing code signing. It is enforcing the walls of the
23 sandbox.

24 If an attack could breach the integrity of the kernel and
25 cause the kernel to stop executing those protections, now the

1 attacker would have free rein over the system.

2 So kernel integrity protection is one of the ways we block
3 tampering with the kernel, by making sure that once the kernel
4 has started up and its basic data structure has been
5 initialized, that those are locked down and unmodifiable so
6 that were an attacker subsequently to try to mount their
7 attack, the operating system won't allow that access.

8 **Q.** Okay. So these sound like pretty sophisticated mechanisms
9 against sophisticated attacks.

10 Are there certain types of attacks that sandboxing, signed
11 code, and malware scanning are not particularly good at
12 protecting against?

13 **A.** Yes. Well, certainly, as you say, there are many
14 protections, and as an industry, it's been an arm's race to
15 innovate in all of these layers.

16 But a challenge is that all the operating system can do is
17 enforce what the user says they want the software to be
18 allowed to do. And so through social engineering attacks, an
19 attacker can often get access to things outside the sandbox by
20 explicitly telling the operating system that that is what they
21 want to have happen.

22 I offered the example earlier about an attack that, under
23 a pretense, asked for access to your photo library. Under
24 normal circumstances, iOS doesn't allow an app, sandbox, to
25 reach out of the sandbox and touch your photos. That is your

1 private information. We don't want to give any app direct
2 assess to that.

3 But if it is an app that has a legitimate reason that you
4 want it to have access to your photos, there is a mechanism
5 for the app to ask -- tell the operating system to ask you.
6 The operating system will present you with a question. If you
7 say "allow," the operating system will essentially open up a
8 hole in the sandbox, allowing the app to have access to the
9 data that you've authorized.

10 And so very often malware is operating not by
11 circumventing the kind of mechanisms we just discussed, the
12 technical mechanisms, but, rather, through social engineering,
13 fooling the user into giving them access to what they need.

14 **Q.** Thank you.

15 Are you familiar with the notarization and gatekeeper
16 mechanisms on macOS?

17 **A.** Yes, I am.

18 **Q.** And let's start -- let's take one at a time.

19 At a high level, what is notarization for Mac iOS?

20 **A.** Okay. So notarization is a process where when a developer
21 has created some software that they wish to distribute, say,
22 over the internet from their website, they first sign that
23 software with their certificate and they then submit that
24 software to an Apple server. And that Apple server performs
25 an automated scan of that software to identify whether it

1 contains any known malware.

2 If it has known malware, then that request is, you know,
3 dropped on the floor. If the software is determined by the
4 automated scan to not have any previously identified malware,
5 then it is -- essentially, the app is notarized and gatekeeper
6 will then -- when the user subsequently downloads that
7 software and tries to run it, the operating system will say,
8 oh, look, this software has been notarized by Apple so I have
9 a higher confidence than I might otherwise in this software,
10 and the user's prompted and they can decide to go ahead and
11 run that software.

12 **Q.** And on the macOS systems, is there malware scanning in
13 any process other than the notarization process?

14 **A.** Yes. So macOS has some malware scanning mechanisms that
15 predate the notarization service. One of them is called
16 XProtect that checks, when a piece of software is run, whether
17 it matches a set of known signatures for malware.

18 **Q.** Okay. Let's take a look at the representation of the wall
19 in terms of defense mechanisms.

20 Are the notarization and gatekeeper mechanisms additional
21 measures on top of what we are looking at on the screen right
22 now?

23 **A.** Notarization really fits in to the signed code and malware
24 scanning. So notarization is a form of server-side malware
25 scanning, coupled with signing, and then gatekeeper is

1 enforcing the signing.

2 Q. Okay. And other than the notarization model, are there
3 other ways to get apps on macOS?

4 A. Yes. The Mac is a system that many hobbyists and software
5 developers use. Sometimes they are developing their own
6 software and trying to run an application that isn't yet ready
7 for distribution to anyone else. And so there are means for
8 developers to say, I want to run this software even though
9 it's not yet notarized.

10 Q. And then does Apple also run an App Store for the Mac
11 system?

12 A. We do, yes.

13 Q. Okay. Is that the Mac App Store?

14 A. Correct.

15 Q. Okay. Let's go back to what is on the screen now.

16 You mentioned that iOS and macOS has all three of these
17 defense mechanisms.

18 Does iOS have any additional layers of protection beyond
19 what is available on macOS?

20 A. It does. And I think we did illustrate them in an
21 addendum to this diagram.

22 Q. All right. So let's take a look at Demonstrative number
23 8.

24 First, why does Apple add additional layers of defenses to
25 the iOS system above and beyond what is there for macOS?

1 **A.** Well, what we are representing here is because of the
2 factors -- the economic factors that we talked about earlier,
3 the iOS ecosystem presents a very attractive target that
4 could fund a very large and active attacker base. We have
5 seen this kind of thing formed in -- for Windows and Android.
6 And the attractiveness of iOS would attract a lot of those
7 red people. Those red people are supposed to indicate bad,
8 bad attacker people. And it's, in part, because of, you know,
9 the opportunity that is represented by those large number of
10 iPhones. The Mac, on the other hand, attracts a lot less
11 attention.

12 **MR. LO:** Okay. Mr. Spalding, could you put up
13 number 9?

14 **BY MR. LO:**

15 **Q.** What is represented on the screen now, Mr. Federighi?

16 **A.** So this is showing both, on the left, the set of security
17 mechanisms on the Mac that we talked about earlier, and then
18 on the right, a high-level representation of the defense in
19 depth in the iOS ecosystem.

20 **Q.** All right. So let's take those one at a time.

21 One of these additional layers in defense is reliability
22 check.

23 What is that?

24 **A.** So since software is part of app review, there are
25 automated checks that are performed against applications; for

1 instance, making sure they launch and they don't crash
2 immediately.

3 And when it comes to fraud, users don't want to pay for an
4 app maybe that doesn't even run at all, and so certain kinds
5 of automated checks can be performed to make sure that the app
6 is actually working.

7 **Q.** Okay. And then you've got a larger section called "human
8 policy review."

9 Briefly, what is represented by that?

10 **A.** Well, there is a lot in there, and it represents the
11 combination of a set of policies for apps in the iOS
12 ecosystem embodied in the App Store policies and app review,
13 having humans look at software in order to enforce those
14 policies.

15 **MR. LO:** Okay. Mr. Spalding, if you could pull up
16 number 10.

17 **BY MR. LO:**

18 **Q.** Mr. Federighi, I put up something else relating to the
19 human policy review.

20 At a high level, what is represented on this
21 demonstrative?

22 **A.** So on the left is a reviewer, and they are using the app
23 review guidelines to assess an application that has been
24 submitted for review.

25 On the right are some illustrative kinds of things that

1 are -- they check as part of their review process that
2 contribute to our security defenses.

3 **Q.** All right. So let's take these one at a time.

4 The first one is "marketing description."

5 **A.** Yeah. And it's one that on the surface you might say what
6 does that have to do with security, but, in fact, it is
7 probably the single most important thing that foils attackers,
8 which is on the App Store, for an app to be reviewed, it has
9 to represent what it does. It has to say, I am this app from
10 this developer. I have this kind of functionality. I have
11 these screenshots of what my app does.

12 And what a human reviewer can do is then take a look at
13 what the app is going to represent itself to the user as doing
14 and what the app actually does when it is run and say, these
15 two match. This is doing the same thing.

16 This frustrates the attacker's most common technique,
17 which is to impersonate being someone else, distributing
18 something else. An attacker cannot, with any long-term
19 success, hope to say I am Adobe Flash to the App Store and
20 have reviewers continuously approve that, oh, this is Flash,
21 because we know there's only one Flash and there is Adobe.

22 And a human reviewer can make that determination, which means
23 an attacker can't take that popular piece of software -- it
24 used to be popular -- and convince users, oh, you want to
25 download that, here it is. Because the marketing description

1 is going to be rejected by the App Store and so the user is
2 never going to see that when they go to download.

3 **Q.** Okay. What is functionality in the context of human
4 policy review?

5 **A.** Well, this is making sure that the app actually performs
6 the functions it alleges to perform. If it doesn't, if it
7 says it is a calculator and it is not actually a calculator,
8 then this can be detected by a human reviewer.

9 **Q.** Okay. And then what about entitlements?

10 **A.** Well, so we have talked about some of the ways that a
11 human can be socially engineered to authorize an app some
12 access, perhaps to personal information.

13 The way that is handled in iOS is governed by what we
14 call entitlements. And so if a developer says, I have an app
15 that I want to -- I want this app to be able to ask users for
16 access to their microphone or I want to ask them for access to
17 their contacts, they have to include in the submission a
18 request for an entitlement, I wish to have the contact's
19 entitlement.

20 An app reviewer can then look at the purpose of the app
21 and the entitlements the author is asking for and say why is
22 this calculator asking for permission to ask for health
23 information? Why is it asking for permission to access the
24 contacts? This makes no sense for this calculator.

25 And at that point, the app won't be approved, and,

1 therefore, the app will never be able to ask for -- ask a user
2 and try to fool or socially engineer the user into that
3 request. Because without the entitlement, they are not even
4 allowed to make the request at runtime.

5 **Q.** And then finally on this list, what is "physical safety"?

6 **A.** Physical safety refers to checking for a class of
7 applications that are inherently risky for users to run.

8 So there have been cases of apps, for instance, that are
9 speed test kind of things, to see how fast your car is going
10 and share it competitively with your friends. You can imagine
11 that would bring about some pretty unsafe behavior and,
12 unfortunately, has.

13 And so those are the kinds of things that the App Store
14 will attempt to identify and block or take down if it's
15 identified that some got through.

16 **MR. LO:** Okay. Mr. Spalding, let's going to number
17 11.

18 **BY MR. LO:**

19 **Q.** So I think you mentioned this a little bit earlier, but
20 what are some of the things that human policy review does for
21 security that may not be present in some of the other layers
22 that we have been talking about?

23 **A.** Well, all of the mechanisms that are enforced on machine
24 are things that the machine really -- the human policy review
25 is the only place those can be accomplished.

1 Because a computer doesn't -- can't actually tell is this
2 an accurate marketing description. Can't actually tell when
3 you run an app is this app doing what the marketing
4 description says. Those technical protections at the bottom
5 are really only able to tell that the thing is doing what any
6 computer program can do, as opposed to the one that is being
7 represented to the user in that marketing description.

8 **Q.** Okay. And then on the right-hand side, representing
9 iOS, there's this "centralized distribution."

10 What is that in reference to?

11 **A.** So centralized distribution is how the software is
12 actually distributed to the user, where the user goes to get
13 software.

14 I mentioned earlier that the Mac has a model where
15 software can be distributed, essentially, from anywhere. You
16 could hand someone a USB stick with some software on it. You
17 could point them at any website and they could download
18 software from those locations.

19 Centralized distribution refers to having a single point
20 of enforcement and a single location that the operating system
21 is required to go to in order to get software. And this is
22 critical to actually ensuring that the user is getting the
23 software from a reliable source.

24 **Q.** If sideloading were to be allowed for iOS and Apple did
25 not have centralized distribution, would that change have any

1 impact on the security of the platform?

2 **A.** Oh, dramatically, yeah. No human policy review could be
3 enforced, because if software could be signed by people and
4 downloaded directly, now there -- you could put an unsafe app
5 up and no one would have checked that policy. You could
6 misrepresent -- and, as I said, the most common attack is to
7 say, hey, I'm Microsoft Word, here I am, and you could
8 represent it that way, and then you could even create a
9 website that was indistinguishable to the human eye as to
10 whether it was Microsoft or not. And now you think you're
11 downloading legitimate software and, in fact, you are
12 downloading a trojan.

13 **Q.** Mr. Federighi, are you aware that --

14 **THE COURT:** So I'm going to ask the obvious question,
15 and because it has come up so many times during the trial.

16 There are multiple stores on the Mac, so that, then, could
17 happen on the Mac. Why can't you -- you know, why should we
18 not allow the same stores to exist on the phone?

19 **THE WITNESS:** Yeah, it certainly -- it is how it is
20 done on the Mac, and it is regularly exploited on the Mac.

21 iOS has established a dramatically higher bar for
22 customer protection. The Mac is not meeting that bar today,
23 and that's despite the fact that Mac users inherently download
24 less software and are subject to a way less economically
25 motivated attacker base.

1 If you took Mac security techniques and applied them to
2 the iOS ecosystem, with all those devices, all that value,
3 it would get run over to a degree dramatically worse than is
4 already happening on the Mac. And as I say, today we have a
5 level of malware on the Mac that we don't find acceptable, and
6 it is much worse than iOS. Put that same situation in
7 place for iOS and it would be a very, very bad situation for
8 our customers.

9 **THE COURT:** Okay. Same question with the Android.

10 **THE WITNESS:** So Android has a considerable malware
11 problem, something like, you know, 50 times the malware of
12 iOS.

13 Some of that is a nuisance; some of that is your bank
14 account got stolen and you are not quite sure how it happened;
15 and some of that is future risk of a cyberattack if someone
16 gets ahold of an Android execution on an Android phone and
17 uses it as a stepping stone to getting access to an industrial
18 system or something else. So it is a problem for Android.

19 With iOS, we've aspired to create something far more
20 secure. All indications are that we have succeeded in doing
21 so. We certainly don't want to slide back to the level of
22 security that we are constrained to with a Mac-like product or
23 something like Android.

24 **THE COURT:** Professor Mickens testified that there
25 was no real difference between the Android -- attacks on the

1 Android versus the iPhone. So what quantitative analysis do
2 you have that would suggest otherwise?

3 **THE WITNESS:** So, certainly, every report I've read,
4 including the recent Nokia report on malware, shows infections
5 of Android devices at something like 30 times that of iOS.
6 Previous reports have shown that to be even more skewed.

7 If you look at the list of top malware afflicting users,
8 you will see Windows, Android, Windows, Windows, Android,
9 Android on the list. You won't see iOS on that list.

10 The results in the real world are just dramatically
11 different, and it is well understood in the security community
12 that Android has a malware problem, and that iOS has
13 succeeded in, so far, staying ahead of a malware problem.

14 **THE COURT:** Proceed.

15 **MR. LO:** Thank you.

16 **BY MR. LO:**

17 **Q.** We were talking about the human policy review,
18 Mr. Federighi.

19 Are you aware that despite Apple's best efforts, sometimes
20 apps get through the human policy review that are against the
21 Apple guidelines?

22 **A.** Yes, unfortunately, that certainly does happen.

23 **Q.** And in that situation, does -- do any of these mechanisms
24 help Apple on the back end?

25 **A.** Oh, absolutely, yeah. From an attacker's point of view,

1 they are thinking about the sort of total lifetime revenue
2 earnings they can make from their malware, because it takes a
3 lot of effort to get through all of these defenses.

4 If -- with centralized distribution, out of the gate they
5 have a poor chance of getting through. Some do. Most -- the
6 vast majority don't. But if they do, they can be pretty
7 confident that eventually they are going to get shut down.
8 And not only will this one instance of this one app get shut
9 down, but then we will have learned and put additional
10 improvements in place that mean that they can't follow up
11 immediately with the same attack over and over.

12 This is dramatically different than what we see on the
13 Mac, unfortunately, without centralized distribution. So on
14 the Mac, we see an attack, we block that malware, and before
15 we have even finished blocking the old malware, they have
16 mutated their malware into a different piece of malware and
17 started distributing that one instead. And it is just an
18 endless game of Whac-A-Mole, because they always have
19 distribution channels available to them to continue their
20 attacks.

21 **Q.** Okay. And with respect to iOS, does Apple's ability to
22 take corrective actions after the fact have any impact on
23 security, you know, ex ante, before the attack even happens?

24 **A.** Absolutely. I mean, this really gets to the deterrent
25 effect. If attackers can't make a consistent business out of

1 attacking the platform, they are less likely to ever mount the
2 attacks in the first place. And that is one of the reasons
3 there is just less malware ever presented to iOS users.

4 **Q.** Okay. Mr. Federighi, you testified earlier that one of
5 the reasons Apple has a higher defense wall for iOS than
6 macOS was the difference in the threat model. Are there any
7 other reasons why the macOS has a different security design?

8 **A.** Yeah, some historical and some based on the nature of the
9 product.

10 The Mac from the beginning has been part of a generation
11 of systems where the expectation is you can get software from
12 wherever, you can hand it to your friend on a floppy disk and
13 run it. That's part of the expectation.

14 But Mac users also expect a degree of flexibility that is
15 useful to what they do. Some of them are software developers,
16 some of them are pros running very unique tools, and having
17 that power is part of it. I think of it as if, you know,
18 we -- the Mac is a car that you can -- you can take it off
19 road if you want, you can drive wherever you want, and that
20 comes with -- as a driver, you've got to be trained. There's
21 a certain level of responsibility to doing that. But that's
22 what you wanted to buy. You wanted to buy a car.

23 With iOS, we were able to create something where, you
24 know, children -- heck, even infants can operate an iOS device
25 and be safe in doing so. So it's really a different product.

1 Q. Okay. On both the iOS side and the macOS side, you
2 mentioned earlier that there were -- there is malware
3 scanning, although implemented slightly different.

4 Is Apple equally successful at keeping out malware on
5 macOS and iOS devices?

6 A. No. As I mentioned a moment ago, we -- unfortunately, we
7 have a significant larger malware problem on the Mac.

8 Q. And how does Apple know that?

9 A. So we, on the Mac, combat malware actively. We have -- I
10 mentioned XProtect earlier. We have another mechanism called
11 MRT, the Malware Removal Tool.

12 As we become aware of malware through our own scans, as
13 well as from reports from third-party antivirus and security
14 companies, we remove that malware. We block that malware and
15 we remove that malware.

16 And in the case of the Mac, we find that we are having to
17 block many instances of malware, I mean, roughly a couple a
18 week and sometimes infecting hundreds of thousands of users'
19 systems.

20 Q. Okay. On the iOS side, is there a Malware Removal Tool
21 as well?

22 A. There is not.

23 Q. Why not?

24 A. We have, honestly, never needed one. The level of
25 malware -- you know, we do a parallel effort on iOS. I

1 think during the last year, when the Mac had something like
2 130 unique pieces of malware we removed, iOS had three, I
3 think, and one of them wasn't through the App Store even.

4 **Q.** So we have highlighted --

5 **MR. LO:** You can take this down, Mr. Spalding. Thank
6 you.

7 **BY MR. LO:**

8 **Q.** We've highlighted some of the differences between iOS and
9 macOS.

10 Overall, is the macOS a safe platform?

11 **A.** So I think, you know, safe if operated correctly. I
12 think, much like that car, you know, if you know how to
13 operate a car and you obey the rules of the road and are very
14 cautious, yes. If you're not -- you know, I've had a couple
15 of family members who have gotten some malware on their Macs.
16 But, ultimately, I think the Mac can be operated safely.

17 **Q.** Okay. Let's take a look at PX741, which is in your
18 binder, but I will ask Mr. Spalding to put it up, as well.

19 Do you recognize what is marked for identification as
20 PX741?

21 **A.** I do.

22 **Q.** Okay. First, is this a document that you personally put
23 together?

24 **A.** No, it's not. I believe it's a marketing document from
25 our website.

1 Q. Okay. Let's turn to --

2 MR. LO: I'll ask Mr. Spalding to just put up page 5
3 of this document.

4 BY MR. LO:

5 Q. And, first, you said, Mr. Federighi, it is a marketing
6 document.

7 What product is this a marketing document for?

8 A. This is for macOS. It says at the top "macOS
9 Security."

10 Q. Okay. And I want to ask you about some of the contents of
11 page 5. And let's start on the left-hand side, "Protection
12 starts at the core."

13 A. Uh-huh.

14 Q. There is a -- the first sentence here is:

15 "Technically sophisticated runtime protections in
16 macOS work at the very core of your Mac to keep your
17 system safe from malware."

18 Do you see that, sir?

19 A. I do.

20 Q. And do you know, generally, what that is in reference to?

21 A. Yeah, all the kinds of protections we talked about
22 earlier, the sandboxing kinds of mechanisms, ASLR, gatekeeper,
23 et cetera.

24 Q. Okay. And then let's go to the third line from the
25 bottom. There is a list of technologies, and this page says

1 that "make it difficult for malware to do harm and they ensure
2 that processes with root permission cannot change critical
3 system files."

4 What is meant by making it difficult for malware to do
5 harm?

6 **A.** Well, this is referring to --

7 **MR. EVEN:** Objection.

8 **THE WITNESS:** I am sorry, what was that?

9 **THE COURT:** What is the objection? Lack of
10 foundation?

11 **MR. EVEN:** I think the witness just testified that
12 it's not his document, it is a marketing document that he
13 didn't write, and so I don't know how he is now going to
14 interpret it. But...

15 **THE COURT:** Overruled. I think he has got the
16 foundation to answer that question, Mr. Even.

17 **BY MR. LO:**

18 **Q.** Mr. Federighi, do you have an understanding of any systems
19 on the Mac that make it difficult for malware to do harm?

20 **A.** Yes. So some of the things mentioned just above, like
21 ASLR, like execute disable, like system integrity protection,
22 are things that should malware end up on your system, that it
23 may contain the kinds of damage that the malware can do.

24 It mentions here not changing critical system files.
25 There are some protections on the Mac to try to block malware

1 from modifying the operating system itself.

2 But, again, with social engineering and other access
3 malware has, when it achieves the kinds of access that's
4 referred to here, it can often get access that's problematic.

5 **Q.** All right. Let's take a brief look at the right-hand side
6 of the same page. And the header here is "Download apps
7 safely from the Mac App Store and the internet."

8 And let's just start at the bottom. The last sentence
9 says:

10 "If there is ever a problem with an app, Apple can
11 quickly stop new installations and even block the app
12 from launching again."

13 Are you familiar with any technologies on the Mac that
14 matches that description?

15 **A.** Yes. So both things like XProtect, as well as the ability
16 in gatekeeper to revoke developer signing certificates, mean
17 that when malware gets on Mac systems and we become aware of
18 it, we can contain the spread by blocking, potentially, future
19 executions of that same malware before it mutates again.

20 **Q.** Okay. And then this paragraph starts with:

21 "Now apps from both the App Store and the internet
22 can be installed worry free."

23 Mr. Federighi, from a security perspective, do you have an
24 understanding of how Apple tries to position the Mac, as
25 opposed to other devices, PCs or laptops that, you know,

1 consumers might be shopping for?

2 **A.** Yeah. We believe, in PC-class devices, that we -- the Mac
3 is the safest platform available, and we aspire to build the
4 mechanisms to make it the safest platform of its type.

5 **Q.** Thank you.

6 **MR. LO:** And, Mr. Spalding, you can take that down.

7 **BY MR. LO:**

8 **Q.** Mr. Federighi, the judge has heard a bit about so-called
9 on-device security.

10 Have you heard that phrase used in connection with iOS
11 before?

12 **A.** Yes.

13 **MR. LO:** And if I could ask Mr. Spalding to put back
14 up number 11.

15 **BY MR. LO:**

16 **Q.** Going back to this demonstrative, Mr. Federighi, which of
17 the defenses on the screen would you characterize as on-device
18 security?

19 **A.** Potentially, the bottom three. As I mentioned, some
20 elements of the malware scan, signed code -- or code signature
21 verification, and sandboxing are enforced on-device on the
22 Mac.

23 In the case of iOS, the malware scan is actually provided
24 in the App Store review process as part of the submission
25 process, but all -- the bottom three can be executed on the

1 device.

2 Q. Okay. And if, going forward, iOS devices could rely
3 only on on-device security mechanisms, would that have any
4 impact on the security of iOS devices?

5 A. Absolutely, yeah. And that's the question I answered
6 earlier. I mean, my feeling is with the sophistication and
7 the economic incentive of that red mob on the right, they can
8 absolutely surmount a wall or walk around the wall that is
9 there on the left.

10 Q. There has also been some statements in this courtroom that
11 maybe what Apple could do is replace all of the mechanisms
12 for iOS with notarization gatekeeper technology, which
13 currently exists on the macOS.

14 And, again, just using kind of the representation that is
15 on the screen now, what would that look like in terms of the
16 defense layers for iOS if we were to replace that with the
17 notarization gatekeeper mechanisms?

18 A. It would look like the diagram on the left.

19 Q. Okay. And what impact would that have on user experience?

20 A. It would subject iOS users to a huge decrease in their
21 safety.

22 Q. We have been talking about, and you've referenced several
23 times, economically motivated attackers.

24 THE COURT: Do you keep stats on how many times you
25 catch something beyond the bottom three on-device security

1 gates?

2 **THE WITNESS:** Yeah. Yes, we do.

3 So as I mentioned with Malware Removal Tool, by the time
4 we get to the position of removing malware infections from
5 customer devices, it's because they -- that malware has,
6 essentially, surmounted the bottom three, right? It has now
7 become malware that's successfully exploiting users' systems.

8 We -- I mentioned earlier that we issue about -- last
9 year, since last May, about 130 distinct kinds of Mac malware
10 had jumped over these fences or these parts of the wall, and
11 we had to remove them. Just one of those had infected 300,000
12 systems, for instance.

13 There are also third parties. Malwarebytes is one that
14 does reports on their estimates of malware that is actually
15 sighted or that they see in the wild.

16 So it's our direct on-the-ground experience in fighting it
17 where we see how much of it is occurring.

18 And we do see that a good part of that malware is
19 surmounting our notarization server defense, that something
20 like 110 instances last year were cases where they
21 successfully -- because it was unknown malware to us and it
22 had fake developer identities that had not been detected, they
23 actually passed notarization and were able to distribute their
24 malware and ultimately run on Mac systems.

25 **THE COURT:** You have four minutes. You have about

1 four minutes before we take a break.

2 **MR. LO:** Okay. Sure.

3 **BY MR. LO:**

4 **Q.** We have been talking about economically motivated
5 attackers.

6 Does Apple have any concerns for iOS device users other
7 than against economically motivated attackers?

8 **A.** We certainly do. There is a class of sometimes
9 nation/state-level or espionage attacks that are very
10 targeted. These are extremely well-funded attackers who will
11 perform extremely targeted attacks, often using unknown --
12 previously unknown zero day exploits to perhaps attack a
13 political rival, a dissident journalist.

14 And these are not the kinds of things that affect the
15 average -- the average person, of course, but there is a small
16 community that it can be, you know, obviously extremely
17 perilous to as technology is exploited in this way. And so
18 it's another big thing that we fight.

19 **Q.** And do these nation/state attacks, do they happen very
20 frequently?

21 **A.** So compared to malware, no, because -- or traditional mass
22 economic-motivated malware, no.

23 The nature of these attacks are the attacker discovers a
24 very, very, very secret bug that costs often millions of
25 dollars to obtain, and they deploy that bug. If that bug were

1 discovered by us -- and we often do discover them -- we
2 immediately shut it down. We -- essentially, we call it
3 burning that vulnerability. Now it is useless to them. That
4 millions of dollars is useless to them.

5 So they have to be extremely surgical of when and where
6 they use it and, in other words, against how many people they
7 use it, because if they used it in a broad way, it immediately
8 gets discovered, and if it gets discovered, it immediately
9 gets shut down.

10 **Q.** Okay. And then just last question before the lunch break.

11 So for the average user, is the nation/state attack kind
12 of a common issue for the average user who is just buying the
13 phone from the Apple store?

14 **A.** No, certainly not. But it's -- I don't want to downplay
15 how important it is and how much we care in fighting it, but
16 it is not something the average user would ever confront.

17 **Q.** Thank you.

18 **MR. LO:** Your Honor, would this be a good time for
19 our break?

20 **THE COURT:** Okay. We will stand in recess, then,
21 until 12 -- oh, wait. I'm off. Sorry. You've got to keep
22 going.

23 **MR. LO:** Oh, all right.

24 **THE COURT:** 20 more minutes. I was looking at 15
25 instead of 35. Maybe that was just wishful thinking. No

1 offense to you, Mr. Federighi.

2 **THE WITNESS:** None taken.

3 **THE COURT:** Okay. 20 more minutes.

4 **MR. LO:** Thank you, Your Honor.

5 We are back, Mr. Federighi.

6 **THE WITNESS:** Okay. Quick break.

7 **BY MR. LO:**

8 **Q.** Outside of attacks by either mass exploitation attackers
9 or nation/state attackers, are there other issues that Apple
10 is thinking about in terms of protecting iOS device users?

11 **A.** Yes. A major concern of ours is protecting users'
12 privacy, as well.

13 **Q.** And when Apple is -- or when you're thinking about
14 protecting users' privacies, what is it that you are
15 protecting the user from or who are you protecting them from?

16 **A.** Well, when you use different apps and websites, it is
17 possible for information to be collected about your activity,
18 have that combined with personal information, have that
19 collected and sold, for instance, to data brokers to build an
20 exhaustive profile that can learn things about you that would
21 probably, you know, surprise you could be known, and then use
22 that information for a lot of purposes.

23 So if -- and if your location could be determined at all
24 times, they could learn not just about where you live and
25 where you work and where -- what bars you go out to at night,

1 but whether -- what clinics you visited, what doctor you've
2 seen.

3 If they can monitor your internet searches, they may learn
4 a lot about your politics. They may learn about a medical
5 condition you or a loved one has. If they monitor your health
6 data, they may learn about your pregnancy or your sexual
7 habits or any number of things.

8 And this information could be used to simply try to sell
9 you more effective advertising, to target you more
10 effectively. It often can embarrass you by revealing such
11 targeted advertising in front of other people.

12 But it also can be used to target you for, essentially,
13 riling people up into activating people politically,
14 activating them in ways that are detrimental to society, or
15 you can end up in a filter bubble where, because of how you
16 have been profiled, unbeknownst to you, you are only seeing
17 certain things.

18 And it can also mean that the kinds of products that are
19 offered to you, potentially the kind of insurance rates that
20 are offered to you, reflect things that no one else should
21 know about you. And so we try to make sure users are in
22 control of their private information.

23 **Q.** Okay. And are you familiar with some of the ways that
24 Apple tries to protect user privacy?

25 **A.** Yes, I am.

1 **MR. LO:** Okay. Mr. Spalding, if you wouldn't mind
2 putting up number 12.

3 **BY MR. LO:**

4 **Q.** Mr. Federighi, what information is on this screen right
5 now?

6 **A.** So these are what we call our security pillars, kind of
7 the leftmost bullets on this list.

8 Security is, of course, the foundation of privacy. If an
9 attacker could access all your data without your control,
10 well, then all bets are off.

11 Data minimization is about making sure that apps only get
12 the data that they need to do their job and no more.

13 Transparency control. Those are other pillars of ours for
14 protecting privacy.

15 **Q.** Okay. So let's start with data minimization.

16 What does that term mean?

17 **A.** Well, it really means minimizing the amount of information
18 that any app gathers about you to be what it actually needs to
19 do the job.

20 So if you're playing a game but that game tries to gather
21 information about your location unnecessarily, why did it need
22 that? If it tried to access your photo library unnecessarily,
23 why did it need that? We try to restrict apps to only ask for
24 and only obtain from the user information that is actually
25 necessary for their purpose.

1 Q. Okay. And we talked about entitlements earlier, so let's
2 talk specifically about the incentivized access.

3 MR. LO: And, Mr. Spalding, if you could put up
4 number 13.

5 BY MR. LO:

6 Q. What are we looking at on the screen here, Mr. Federighi?

7 A. Well, this is an example of a bad pattern that is against
8 App Store policy with respect to incentivized access, which is
9 while apps can ask for certain kinds of information, they are
10 prohibited from asking for information withholding
11 functionality, for instance, if the user doesn't give up
12 personal information.

13 So in this case, an app is saying, well, it would like
14 access to your contacts, and that's -- it asks the system to
15 ask the user. And then the user, let's say, says don't allow,
16 why do I want this thing to have access to my contacts, in
17 this bad pattern, what this app then does is follow up with
18 what we call incentivized access, say, are you sure? If you
19 just give us access to your contacts, we'll give you these
20 great features, like high-resolution photo backup, and so
21 forth.

22 This is incentivizing people to give up their privacy.
23 And you can imagine in the context of a game that a child is
24 playing to say can you just give me access to your location
25 and I'll give you access to the next level, and so forth. And

1 so this is a pattern that the App Store has a policy against.

2 **Q.** Okay. And then moving down, what is transparency?

3 **A.** So transparency means, essentially, making transparent to
4 the customer what access an app has to their data so they
5 understand kind of what bargain they are making, what the
6 consequences are of using that software.

7 One example of this, I guess, if we click to the next
8 slide, is the nutrition label. Recently, Apple rolled out a
9 policy around what we call app privacy labels, and
10 colloquially nutrition labels, that kind of serve the same
11 purpose that nutrition summary information serves on the side
12 of a box of cereal. You know, you might read the ingredients
13 and say, I'm not sure what monosodium glutamate and high
14 fructose corn syrup are, but you can look at the top and it
15 will say, okay, how many calories from sugar, how much
16 protein, how much fat, and then I can compare products in ways
17 that maybe I can reason about.

18 With privacy labels, we seek to do the same thing, have
19 developers submit accurate information to a set of coherent
20 categories that we can then represent to the user in a way
21 they can understand so that before they make the decision to
22 download an app, they have some understanding about how that
23 app treats their data.

24 **Q.** Okay. And what about control? What is being represented
25 there?

1 **A.** Well, control is -- it is one thing to have transparency
2 to know what an app might be doing, and you can make the
3 decision, well, based on that, I am not going to use the app
4 at all. But control gives you finer-grained ability to say,
5 well, I do want to use this app, but I don't want to give this
6 app access to my location.

7 Or, as we see -- and that is really what transparency,
8 consent, and control, or TCC, as we call it internally, is.
9 This example is Apple's own maps app. Maps, of course, can
10 make productive use of your location to help you get from
11 where you are to maybe where you are going. Maps has to ask
12 the system to ask the user to give access to location. The
13 user could say, allow once, yep, for this time using the app,
14 tell it where I am, but next time ask me again; they could say
15 don't allow, I don't want this app to have access to my
16 location. And the system will enforce that access, so that's
17 a form of control.

18 **Q.** Okay. And you mentioned app tracking transparency a
19 little bit earlier, but what is that?

20 **A.** So app tracking transparency is an App Store requirement
21 that if an app is engaging in activities to attempt to
22 identify you and track your activities across multiple
23 vendors' apps and websites, the kind of interacting with data
24 brokers and trading information that we talked about earlier,
25 that they have to ask the user's permission.

1 And the user can say, allow that, sure, I'm okay with it,
2 or they can say, ask app not to track, in which case the App
3 Store policies say that the app is not allowed to then engage
4 in that activity.

5 **Q.** Okay. Do some of these privacy measures involve
6 mechanisms on the operating system and on the device?

7 **A.** Yeah, it is a combination of really working hand in hand
8 between mechanisms in the operating system and enforcement
9 through app review and the teeth of centralized distribution.

10 **MR. LO:** Okay. And, Mr. Spalding, if you could put
11 up number 19.

12 **BY MR. LO:**

13 **Q.** And we talked a little bit earlier about the human policy
14 review, and now we are seeing two more items down here.

15 What is being represented here, Mr. Federighi?

16 **A.** So in addition to the security-oriented review items we
17 talked about before, the top four, we're showing that there
18 are additional items that are part of App Store review
19 policies that are enforced by app review, telling -- by
20 reviewing the app, is this app participating in incentivized
21 access? Did this app present a nutrition label or not?

22 And these become criteria to now participate in the app
23 ecosystem, that you need to respect the user's privacy in
24 these ways with transparency and control.

25 **Q.** Okay. Earlier on when we were looking at the wall

1 representations, we talked about centralized distribution and
2 how that relates to security.

3 Is there any relationship between centralized app
4 distribution and privacy control measures?

5 **A.** Yeah, absolutely. Many of these policies are -- we know
6 of no way to purely enforce them on device.

7 It is important that a human can look and spot that
8 pattern of incentivized access. No computer can run that
9 program and say, hold on, why are they trying to convince the
10 user to give up their email address before they can play this
11 level on the game. A human can make that determination.

12 And without centralized distribution, there are many
13 entities who would love to get around these privacy
14 protections. They have an economic incentive, potentially, to
15 do so. If they could distribute outside the App Store and
16 thereby avoid having to deal with these App Store guidelines,
17 they likely would.

18 And so these protections really are only enforceable
19 through app review and centralized distribution.

20 **Q.** Let's change subjects a bit.

21 Are you familiar with something called the Enterprise
22 Program?

23 **A.** Yes, I am.

24 **Q.** And what is it, at a high level?

25 **A.** So the Enterprise Program for -- Developer Program for

1 iOS apps is meant to enable companies, larger companies, who
2 have apps they build for the use of their own employees.
3 These aren't apps they want to sell to the general public;
4 these are apps that either -- maybe it is the app to order
5 from their cafeteria and they've got an internal app for that
6 purpose, or maybe it's something that's much more like core
7 intellectual property, like Pixar building an app for
8 designers to use to do 3D modeling. They want to build that
9 app internally, they want to provide it just to their
10 employees, but they don't want to sell it to others. And the
11 Enterprise Program is meant to give them the ability to do
12 that.

13 **Q.** Okay. And the document's in your binder, but I'll ask
14 Mr. Spalding to put it up. Let's take a look at PX2519 for
15 identification.

16 Mr. Federighi, do you recognize the document that is on
17 the screen right now?

18 **A.** Yes. It is a description of the Developer Enterprise
19 Program from Apple's developer website, I believe.

20 **Q.** Okay. And let's take a look at the bottom half of the
21 page where it talks about eligibility, and there is five
22 bullet points underneath that.

23 Can you explain just at a high level what the eligibility
24 requirements are for the Enterprise Program?

25 **A.** Yeah. Essentially, this is saying does this use fit the

1 criteria I described, which is are you a meaningfully large
2 organization, are you trying to develop software that's for
3 your internal employees' use, not to distribute outside, and
4 do you have systems to ensure that the only people that are
5 going to run these apps are, in fact, your employees and that
6 others aren't going to end up getting ahold of these apps.

7 **Q.** Do you have an understanding of why Apple has these
8 restrictions in place for the Enterprise Program?

9 **A.** Yes. The primary protection here against this being used
10 to distribute malware, for instance, is that only -- we think
11 an employer typically will not be attacking their own
12 employees, that if you are developing software for your own
13 employees to run, there's a trust -- a specific trust
14 relationship and dependency between the employer and the
15 employee. And as long as the software stays within that
16 relationship, you no longer have attacker/victim as the
17 dynamic.

18 **Q.** Do Enterprise apps undergo Apple's human app review
19 process?

20 **A.** They do not.

21 **Q.** And if they don't undergo app review, is it fair to say
22 that the Enterprise Program apps are safe because the
23 on-device systems are plenty sufficient to protect end users?

24 **A.** No, not at all.

25 **Q.** Okay. And so what mechanisms -- and you may have

1 mentioned a little bit already -- but what mechanisms are in
2 place to protect users of apps that are distributed through
3 the Enterprise Program?

4 **A.** Well, the primary one is establishing the trust
5 relationship between the enterprise and the employee. So for
6 an employee to run an app from their employer, they need to
7 install a -- what's called a profile on their device that
8 says, I am an employee of this organization and I trust the
9 software that they would provide to me, and then we are
10 relying on the enterprise themselves to safely use the
11 software and not distribute bad software to employees.

12 So you can think of the incentive system there to be
13 different than it would be for a malware attacker who is
14 trying to get onto any consumer's device.

15 **Q.** Does Apple's Enterprise Program demonstrate that the iOS
16 platform can be perfectly safe even if there were widespread
17 distribution of apps without undergoing app review?

18 **A.** Oh, not at all. I mean, actually, quite the opposite.
19 This has been an area of significant abuse.

20 So even though we have the practices that are described
21 here, there has been a pattern of fake companies signing up
22 for these Enterprise accounts and using them to set up
23 alternate app stores, and those app stores are absolutely full
24 of trojan and virus software.

25 And, in fact, that recent Nokia report I mentioned

1 recently was talking about that it was these -- well, it was
2 third-party stores generally, in fact, in that case that were
3 the primary source of malware being distributed in the Android
4 environment, but in the iOS environment we have seen all
5 manners of attack through these both piracy kind of illegal
6 activity apps and very often malware.

7 **Q.** And these Enterprise Program abuses where there is malware
8 and attacks, do they still involve the employer-employee
9 relationship where it's an employer attacking their employees?

10 **A.** No. In this case, this fraudulent entity that's claiming
11 to be a company sets up their app store and then tells their
12 broad clientele that aren't employees at all saying, hey,
13 look, if you want to get, you know, this cheap software or
14 free software or whatever it is, just install this profile --
15 they come up with some explanation for why that is okay -- and
16 then the user downloads it and then can download the software
17 as a now pretend employee of this pretend company.

18 **Q.** Okay. Thank you.

19 **MR. LO:** Mr. Spalding, you can take that one down.

20 **THE COURT:** So he has now mentioned these Nokia
21 reports a couple of times. Are they in evidence? Going to be
22 in evidence?

23 **MR. LO:** Your Honor, they are on the stipulation that
24 has been submitted, and our expert, who is going to be two
25 witnesses after Mr. Federighi, will be discussing them live,

1 yes.

2 **THE COURT:** Okay. Thank you. Proceed. This time,
3 five minutes.

4 **MR. LO:** All right.

5 **BY MR. LO:**

6 **Q.** I want to ask you, Mr. Federighi, about the consequences
7 of opening up iOS to sideloading.

8 Suppose that going forward, anyone and everyone could
9 distribute apps directly to iOS device users. What impact,
10 if any, would that have on overall security?

11 **A.** As I mentioned earlier, I think it would be a pretty
12 devastating setback for iOS security. I think we would see
13 the kinds of effects that have been experienced on Windows and
14 on Android, in that it would become commonplace for users to
15 be directed to download misleading/misrepresented software
16 from untrusted sources where they would be subject to malware.

17 **Q.** What if we didn't open the gates wide open? What if we
18 said that only certain selected and trusted stores could
19 operate, but it would be more than just Apple being able to
20 operate its App Store?

21 **A.** I guess I'm not sure how that would work. I mean, I'm not
22 sure who would identify -- does Apple get to pick who the
23 trusted stores are or does someone else? And who would
24 validate that they are trusted and what enforcement mechanisms
25 would there be if they behaved in an untrustworthy manner?

1 And how would you -- as we have seen with the Enterprise
2 Program, where we have attempted to identify trustworthy
3 entities, in effect, there's a lot of fraud around where
4 non-trustworthy entities are constantly popping up.

5 And now, once that free distribution mechanism exists, you
6 get directed to a counterfeit app store. You can easily get
7 fooled.

8 **Q.** Okay. If the app distribution were to be open to
9 alternate stores, couldn't some users who are more
10 conservative about security simply say, I'm just going to
11 continue to shop at the Apple App Store; I'm not going to go
12 to any other store? Isn't that a possible choice that they
13 could make for their own security?

14 **A.** Well, unfortunately, in practice, very often not. If
15 developers wanted, for instance, to get around certain App
16 Store policies protecting privacy or other rules, they may
17 make their app only available through an alternate app store
18 or for sideloading. And users may need that app.

19 Where today, that app will be on the App Store and will
20 conform with Apple's policies, in this future world, in fact,
21 many of those apps may no longer be available in the App
22 Store, maybe will no longer have gone through app review. And
23 if the user needs that app for their job, for school, for --
24 to be in the right social group with their friends, whatever
25 it is, they may have no choice but to go get it from the only

1 place it is available, which may not be the App Store.

2 **Q.** What if I defy the social conventions -- in other words, I
3 am strict about just going to the Apple App Store -- and even
4 if my job requires me to go to another app store to download
5 an app, I say, no, I'm just going to stick to the Apple App
6 Store. If that is me, am I just as safe, say, a year from now
7 in an open distribution system as I am today shopping at the
8 Apple App Store?

9 **A.** So from what we have seen happen in the Windows ecosystem,
10 unfortunately, the answer is no. What is -- essentially,
11 there is an exploitation innovation economy out there. If you
12 start feeding the blood supply of attackers with a revenue
13 model around exploiting our users, they start to develop sets
14 of people with that expertise, start developing tool chains,
15 start figuring out more and more ways to attack the platform.

16 Once that base of attackers gets highly funded and
17 develops those tools, they start to turn those tools on the
18 largest audience they can in any means they can.

19 And, you know, Microsoft had security problems back in the
20 day. For the last 20 years, they have actually done a lot of
21 good work to try to improve their on-device security
22 mechanisms. Nonetheless, to this day, they are the --
23 continue to be the most exploited platform, simply because
24 they built up that base of motivated, educated attackers that
25 mount ever more sophisticated attacks on the platform.

1 And iOS is an attractive enough ecosystem that it could
2 result in a similar thing if it gets that source of blood
3 supply from not a responsible user like you, but the rest of
4 the users who start the ball rolling.

5 **THE COURT:** Okay. Now is a good time.

6 **MR. LO:** Yes, it is. Thank you, Your Honor.

7 **THE COURT:** All right. We will stand in recess until
8 1:15. Thank you.

9 **MR. LO:** Thank you.

10 (Recess taken at 12:36 P.M.)

11 (Proceedings resumed at 1:15 p.m.)

12 **THE COURT:** Okay. We are back on the record. The
13 record will reflect the witness is on the stand. The parties
14 are present. Mr. Lo is at the podium.

15 You may proceed.

16 **MR. LO:** Thank you, Your Honor.

17 One housekeeping matter. We would move Exhibit 2519 into
18 evidence.

19 **THE COURT:** Mr. Even? I think that's the --

20 **MR. EVEN:** No objection, Your Honor.

21 **THE COURT:** Okay. Admitted.

22 **MR. LO:** Thank you.

23 (Defense Exhibit DX2519 received in evidence)

24 **BY MR. LO:**

25 **Q.** Good afternoon, Mr. Federighi.

1 **A.** Hello.

2 **Q.** Before the lunch break, we were talking about users'
3 ability to pick from among different stores.

4 **MR. LO:** And I'm going to ask Mr. Spalding to put up
5 Slide No. 6.

6 **BY MR. LO:**

7 **Q.** Mr. Federighi, could you tell us what we're looking at on
8 the screen here?

9 **A.** Yes. This is a screenshot of an actual website that was
10 used as a malware distribution mechanism. There was a
11 commercial application called SketchUp where the attacker
12 turned it into a trojan by putting malware into SketchUp and
13 then created a website that was meant to exactly mirror the
14 look of the -- of an Apple site -- you can see even across the
15 top it looks like an Apple marketing site, with Mac, iPad,
16 iPhone, and Watch, etc. -- but where, when the user downloaded
17 this, they were actually not downloading from Apple, they were
18 downloading from an attacker site and were downloading
19 malware.

20 **Q.** Thank you.

21 **MR. LO:** You can take that down, Mr. Spalding.

22 **BY MR. LO:**

23 **Q.** To continue our discussion regarding app distribution, if
24 Apple were to open up app distribution to all parties, would
25 that open up the possibility of users getting apps from other

1 users?

2 **A.** Yes, certainly. One of the ways software could be
3 distributed was via direct messaging or handing someone a, you
4 know, USB stick or equivalent for sure.

5 **Q.** And does the ability for a user to download and install an
6 app directly from another user -- does that create any
7 security implications?

8 **A.** It does, yes. You could get access potentially to where
9 you think you're getting a message from a trusted friend, but
10 actually maybe the contact list has been pulled from your
11 friend's device and it's not really from him. But you install
12 it because you trust him that he says this is a great app, and
13 that's the way you get the malware.

14 **Q.** We've been talking a lot this morning or now this
15 afternoon about iOS device users.

16 If app distribution were to be opened up so that
17 sideloading is allowed for iOS devices, do you think that that
18 would have any impact on iOS developers?

19 **A.** Certainly. One of the great things about -- we think
20 about the App Store is it's a trusted source of apps. And
21 because of that trust and that confidence that users have,
22 they are very free about trying out new software, about trying
23 new apps, about downloading lots of things. And that's helped
24 build this really unprecedented scale of activity for
25 developers, of opportunity for developers, on the App Store.

1 If they become more wary, if they start having bad
2 experiences where they feel like they have to be careful and
3 don't trust downloading, this will mean they are less likely
4 to do so and this means less opportunities, especially for new
5 developers who might be trying to get recognized. They might
6 be seemingly less trusted and they're less likely to have good
7 opportunity to reach users.

8 **Q.** Okay. So we've been talking about the various things that
9 Apple does to protect security.

10 Do you believe that the security functions are something
11 that Apple might be able to hand off to a third party to do?

12 **A.** Certainly I think that there are parts of our security
13 stack that is integrated in a way end to end, really, from
14 silicon and operating system up through our code signing, our
15 services, and our review. It would be difficult to accomplish
16 with an entity outside of Apple effectively.

17 **Q.** And then what about for privacy issues? Would you have
18 any concerns if the control over and the protection of user
19 privacy were handed off to a third party outside of Apple?

20 **A.** I would have grave concerns. I think there are a number
21 of -- of business entities who have really very different
22 philosophies about privacy than Apple do.

23 And, of course, users who -- who want those -- have that
24 expectation, they may choose to buy another product like an
25 Android phone. But many people who buy an iPhone buy it

1 because of our unique values on security and privacy, and I do
2 fear that many companies would not enforce the same kinds of
3 guidelines that we believe customers -- our customers really
4 care about.

5 **Q.** And let me just ask a variation of that.

6 If Apple, as well as third parties, were permitted to
7 distribute apps, would that have any impact on Apple's ability
8 to enforce its privacy policies?

9 **A.** In practice for sure, because many developers may
10 choose -- if they want to engage in activities that are not
11 consistent with Apple's privacy policies, they would seek
12 distribution from distribution points that don't have those
13 protections, and now users would end up very often being
14 forced to download from those alternatives if they wanted to
15 get those apps.

16 **Q.** Mr. Federighi, do you believe that Apple is incentivized
17 to protect the security and the privacy of iOS device users?

18 **A.** Oh, absolutely. I mean, it's completely central to what
19 we do. We -- I think when users buy an Apple device, they're
20 buying it because they've chosen an intuitive consistent user
21 experience that's -- that's safe, that they can trust. And
22 those are -- those are things we've invested tremendously in
23 creating and maintaining and that has great value to the
24 differentiation of our product.

25 If -- I don't think anyone else cares as much about

1 maintaining those -- those assets or that user promise as
2 Apple does for our customers.

3 **Q.** We've been talking about security and privacy. Let me
4 switch topics for a little bit.

5 As part of your work on the operating systems, do you have
6 any responsibility for the iOS human interface aspects?

7 **A.** Yes. So my team, as I mentioned earlier, the operating
8 system that we create really runs the gambit from the
9 low-level engine to the -- the icons on the screen, the
10 gestures you use to swipe between your home pages and launch
11 applications and so forth.

12 So working in concert with our human interface design
13 team, my team delivers all of those -- the iOS user
14 experience.

15 **Q.** And you made a little bit of reference to it already, but
16 when you're talking about human interface in the context of an
17 iOS device, what do you mean by that?

18 **A.** So it's -- it's how it looks, how it works, how you
19 interact with it.

20 So if you're familiar with your iPhone, you know about the
21 grid of apps and how you tap them and how they open and how
22 you exit an app, how you move between applications. That --
23 that whole -- all the -- how the controls look. All the
24 things that -- that make an iOS device really easy for so many
25 people to use, that's part of that user experience that we

1 define.

2 Q. And in your work on the human interface aspects of the
3 operating system, do you have to consider streaming games from
4 time to time?

5 A. This is definitely a new area that's come up over the last
6 few years, yes.

7 Q. Okay. And -- well, first, do you know whether iOS
8 supports streaming games?

9 A. We do.

10 Q. Okay. And does Apple require streaming games to comply
11 with any human interface requirements?

12 A. We do. So all -- all apps that are distributed through
13 the App Store are required to meet our human interface
14 guidelines, which help maintain a consistent and easy user
15 experience for our customers when they download apps from the
16 App Store. And, of course, streaming games are no different.

17 Q. Are streaming games on iOS devices required to be
18 individualized?

19 A. So yes. So central to the iOS user model is this idea of
20 how apps are managed. Really, apps are kind of the center of
21 the iOS experience. You open your device and there's a bunch
22 of apps on that home screen. You, as a user, are accustomed
23 to how you discover apps, how you launch apps, how you -- how
24 you delete them, how you switch between them, how you manage
25 them, all -- all of that.

1 And so for streaming apps, our policy is that each
2 streaming game which constitutes, for the user, a distinct
3 application experience be distributed as a distinct app that
4 they can discover in a consistent way from the App Store,
5 download, and launch independently from other games on the
6 streaming service.

7 **Q.** Okay. Outside of the -- just the experience aspect of
8 individualized apps, are there any privacy control reasons for
9 the individualized app requirement with respect to streaming
10 apps or games?

11 **A.** Yes. I -- there are certainly privacy and management
12 reasons.

13 Users certainly are accustomed to setting parental
14 controls, for instance, on a per-game limit or per-app limit.
15 They are accustomed to getting ask to buy notifications before
16 maybe their child would get access to another title or
17 screentime monitoring.

18 But also when it comes to privacy, when -- as we discussed
19 earlier, for each app, the user is given the -- a choice
20 whether -- what they allow the app to access. So you might
21 say that if I were playing *Pokémon Go*, which involves finding
22 things in the real world, I might allow that app access to the
23 camera and access to location. That's something that game
24 needs.

25 But I might be playing, I don't know, *Assassin's Creed* and

1 I would not give that app access to location or access to the
2 camera. I get individual control if everything on the -- if
3 each app is managed distinctly as an app where the user has
4 privacy controls.

5 **Q.** And so let me just ask the question from the other
6 perspective.

7 If a developer were permitted to lump all of their apps
8 together into a single app, what implications, if any, would
9 that have on Apple's privacy and control policies?

10 **A.** Well, you -- you'd lose all of that individual management.
11 So now you'd have to give that aggregator app access to the
12 sum of all the permissions of any apps you used. You'd have
13 to say, Well, I guess this app I play, the *Pokémon Go*, needs
14 location, so I'll give the aggregate app location. And then,
15 Oh, this app needs my contacts and that's okay, so I'll give
16 it that.

17 But now they all have it, potentially. There is no way at
18 the system level for us to enforce or give you visibility as
19 to which of these applications has that access.

20 **Q.** Are you familiar with games that have user-created
21 content?

22 **A.** Sure, things like *Minecraft* and -- yeah.

23 **Q.** Yeah. So can you explain what you understand user-created
24 content to mean in the context of game apps.

25 **A.** Sure. So very often, games define a kind of interface

1 style, a graphical style, a control scheme, kind of the way it
2 feels to use the game, the way the world -- the world works.

3 And then some games like -- like *Minecraft* let you
4 create -- modify the world, you know, maybe create another
5 place to play and a little -- little -- a level or an
6 adventure, for instance. The mechanics are the same, the game
7 is, you know -- it's *Minecraft*, but you're playing in a
8 different area of *Minecraft*, essentially.

9 **Q.** Okay. And so then from a human-interface perspective, how
10 does Apple look at games with user-created content?

11 **A.** Well, we -- we look at them as a -- given -- as long as
12 the experience is consistent where it feels more like
13 different parts of a common experience and common game, we
14 find that a user, in their mind, thinks of it as -- as one
15 game.

16 In other words, if -- if you asked a kid who was playing,
17 you know, some particular part of *Minecraft* and you said, What
18 are you playing, they're going to say, Well, I'm playing
19 *Minecraft*.

20 This is different than on a -- let's say a streaming
21 service that was aggregated, where if you were playing *Halo* or
22 you were playing *Pokémon Go* in the service, if I asked you
23 what you were playing, you would say, I'm playing *Pokémon Go*;
24 you wouldn't say, I'm playing, I don't know, Xcode Cloud or
25 something like that.

1 And so we want the user model and the interface model to
2 match. That's what delivers an intuitive experience.

3 Q. Now, Mr. Federighi, are you aware that on the iOS App
4 Store, there are certain apps that allow, for example,
5 streaming media, like Netflix?

6 A. Of course, yes.

7 Q. And apps like Netflix, are you aware that they may have
8 very different genres of shows or movies and, you know,
9 they'll have series and also movies and documentaries? You're
10 aware they can have a variety of content there?

11 A. Yes.

12 Q. Okay. So comparing to what -- the human interface aspects
13 of the streaming games you just talked about, how does Apple
14 view something like Netflix, which may have a variety of shows
15 of different genres?

16 A. Yeah. So media -- from the outset of the definition of
17 the iOS user experience, media, like music or video, has
18 always had -- been managed in collections as part of apps,
19 whether it's, you know, the Apple Music app or Spotify or the
20 video app.

21 And the experience -- those individual experiences, you
22 know, one song or another song, one video or another video,
23 these are not different application experiences, from the
24 user's point of view. You know, there is a play button.
25 There is a pause button. They play the same way. They don't

1 require unique security permissions. The user often doesn't
2 have with a single episode, let's say, the kind of, you know,
3 30- to a hundred-hour relationship they might have with a
4 given game title that they're coming back to repeatedly.

5 So we draw a real distinction between the user's
6 expectations for playing and managing apps than we do for
7 individual pieces of media for passive consumption inside of
8 something like Netflix.

9 **Q.** And so when some -- when something like Netflix has
10 different movies or different shows, does Apple require them
11 to be separated out into individual apps?

12 **A.** No. No. That wouldn't make sense.

13 **Q.** Thank you, Mr. Federighi.

14 **MR. LO:** Your Honor, pass the witness.

15 **THE COURT:** Cross, Mr. Even?

16 **MR. EVEN:** Thank you, Your Honor.

17 **THE COURT:** While he is getting ready, I take it you
18 still have that opinion after everybody has been bing-watching
19 during the pandemic?

20 **THE WITNESS:** There has certainly been a lot of
21 quantity, hasn't there. But to answer your question directly,
22 yes, I still hold that opinion.

23 **THE COURT:** Whenever you are ready, sir.

24 **MR. EVEN:** Thank you, Your Honor.
25

CROSS-EXAMINATION

BY MR. EVEN:

Q. Good afternoon, Mr. Federighi.

A. Hi.

Q. Good seeing you again. Better in real life than over Zoom.

MR. EVEN: Your Honor, may I approach and provide some --

THE COURT: You may.

MR. EVEN: -- binders?

THE COURT: And maybe you can pick up the binders, too, on your way back, Mr. Niu.

BY MR. EVEN:

Q. So, Mr. Federighi, I'd like to start with a couple of things that you went over on your direct. And maybe I'll start from the end.

I think you said that apps are the center of the iOS experience; is that right?

A. Correct.

Q. And you said that in the context that Apple's current model, you believe, is good for developers; correct?

A. That wasn't the context in which I made that particular remark.

Q. That was your testimony, that the current model by Apple is favorable to developers; correct?

1 **A.** Well, I believe broadly so, yes.

2 **Q.** But Apple has gotten that testimony from you. Apple
3 doesn't have a single developer coming in here and saying that
4 the developers support Apple's current model; correct?

5 **A.** I'm sorry. What's the question?

6 **Q.** The question is does Apple have a single developer coming
7 into this court and saying that they believe that Apple's
8 current model is somehow good for developers?

9 **A.** Oh, I actually don't know.

10 **Q.** Okay. The Court asked you about some data about malware,
11 etc.

12 Do you recall?

13 **A.** Yes.

14 **Q.** And you cited some Nokia report that obviously you have
15 not conducted; correct? That's not a study you conducted?

16 **A.** That's correct. I did not.

17 **Q.** And that's not a study you were involved with?

18 **A.** No. I just read it.

19 **Q.** And obviously that study is not going to be in evidence,
20 but when I asked you in your deposition if you had any
21 statistics at all about the prevalence of malware in notarized
22 applications downloaded from third-party stores on the Mac,
23 you told me you have none; correct?

24 **A.** That's not quite the way I answered the question at the
25 time.

1 Q. Okay.

2 A. What I described to you --

3 Q. Okay, sir --

4 A. Okay.

5 Q. -- you have before you --

6 MR. EVEN: Your Honor, I'd like to direct
7 Mr. Federighi to his deposition at pages 59, line 24, to 60,
8 line 5.

9 THE WITNESS: I'm sorry. Where are we going?

10 THE COURT: So, Mr. Even, he needs direction.

11 BY MR. EVEN:

12 Q. Sir, if you go to your deposition transcript, which I
13 believe is a separate spiral --

14 A. Yes.

15 Q. -- booklet, and if you go to page 59, line 24.

16 A. Okay.

17 Q. And do you see that I asked you, "Do you have any numbers
18 of the numbers of the prevalence of malware in signed,
19 notarized applications downloaded from third-party stores?"

20 And you answered, "I don't."

21 Do you see that?

22 A. Yes.

23 Q. And then I asked you, "Do you know if there have been
24 any?"

25 And you say, "I don't have any data on that at all."

1 Correct?

2 **A.** That's correct. But I do have that data now.

3 **Q.** That's what you said at the time?

4 **A.** Yes, it is.

5 **Q.** Thank you.

6 Now, you also were asked some questions about the

7 Enterprise Program; correct?

8 **A.** Yes.

9 **Q.** Now, the Enterprise Program works through a certificate
10 that Apple gives; correct?

11 **A.** Yes.

12 **Q.** And that certificate allows the developer to, essentially,
13 install an app on any phone that has the requisite profile;
14 correct?

15 **A.** Correct. The user first installs the profile and then
16 they can run an app distributed by that developer.

17 **Q.** And that does not go through any process like notarization
18 or anything like that; correct?

19 **A.** That's correct.

20 **Q.** And when you say that there have been stores in China that
21 abuse that process, those stores have -- had to have been
22 vetted by Apple first before obtaining that certificate;
23 correct?

24 **A.** They had to apply for an Enterprise Developer Certificate
25 and claim to be a business, correct.

1 Q. Okay. And so to the extent these stores operated in
2 China, that was because Apple failed to do a thorough
3 background check on these stores; correct?

4 A. That's a very tough job.

5 Q. Is that a "yes," sir? That was a failure on Apple's part
6 to do a thorough background check; correct?

7 A. I wouldn't characterize it that way, but if we had done
8 a -- if we had figured out that those --

9 Q. Sir, it's a yes-or-no question.

10 That was because Apple failed to conduct a thorough enough
11 background check, isn't it?

12 A. Well, I can't really answer that as a yes/no.

13 Q. You don't know?

14 A. Sorry. I do know. You say "thorough enough." That
15 presupposes that if --

16 Q. Sir, these -- these stores received a certificate --

17 A. Yeah, correct.

18 Q. -- correct?

19 A. They did receive a certificate, that is correct.

20 Q. They received a certificate after validation by Apple;
21 correct?

22 A. That's correct.

23 Q. And as it turns out, they should not have received that
24 certificate; correct?

25 A. Ultimately, yes.

1 Q. Thank you.

2 Now, you were -- I think you mentioned up front that from
3 1999 to 2009, you worked for a company called Ariba; correct?

4 A. Yes.

5 Q. And when you rejoined Apple in 2009, you worked on
6 engineering for the macOS; correct?

7 A. Yes.

8 Q. And at the time, you had very little responsibility for
9 iOS; correct?

10 A. Yes.

11 Q. And you did not take over direct responsibilities for iOS
12 until the 2011, 2012 time period; correct?

13 A. That's correct. It was actually late 2012.

14 Q. Okay.

15 A. I took over responsibility for parts --

16 Q. That's enough, sir.

17 A. Okay.

18 Q. You answered the question.

19 And so you were not at Apple when the first iPhone was
20 launched in 2007; correct?

21 A. That's correct.

22 Q. And you were not at Apple when the iOS App Store launched
23 in 2008; correct?

24 A. Yes, correct.

25 Q. And in 2012, when you did take over responsibility for

1 iOS, you did not join what's called the ERB or Executive
2 Review Board that oversees app review; correct?

3 **A.** Personally, no.

4 **Q.** And, therefore, you have no personal firsthand knowledge
5 of any decisions concerning the launch of the iPhone; correct?
6 You were not there?

7 **A.** Right. I heard about it after the fact.

8 **Q.** And you don't have any personal firsthand knowledge about
9 the launch of the iOS App Store; correct?

10 **A.** Yes. Correct.

11 **Q.** And you have no firsthand knowledge of what considerations
12 went into the design process for opening of the App Store;
13 correct?

14 **A.** Only from talking to the people who did the work.

15 **Q.** I understand, sir. My question was about your firsthand
16 knowledge. You have none; correct? You were not there.

17 **A.** I was not there at the time, correct.

18 **Q.** And you have no firsthand knowledge of any threat model
19 performed by the iOS security team at the time of the launch
20 of the iPhone; correct?

21 **A.** Yeah. Only retrospectively.

22 **Q.** And any threat modeling that was done at the time was done
23 by the people who were there and in charge of security at the
24 time; correct?

25 **A.** Correct.

1 Q. Now, at the time, the person who was tasked with
2 developing iOS was Mr. Forstall; correct?

3 A. He headed up the program, yes.

4 Q. And you do understand that Mr. Forstall at the time was a
5 proponent of using what's known as macOS 10 as the basis for
6 the iPhone OS; correct?

7 A. Incorrect.

8 Q. Okay. If Mr. Forstall testified to that, was he wrong?

9 A. He wanted -- I talked to Mr. Forstall about this --

10 Q. Sir, if Mr. Forstall testified to that, was he wrong?

11 A. I think he might have given -- he might have been
12 imprecise.

13 Q. Sir, if you'd turn to your -- Tab 1 of your binder. Go to
14 page 57 of Mr. Forstall's deposition.

15 A. I'm sorry. Could you tell me the page number again?

16 THE COURT: He said Tab 1.

17 BY MR. EVEN:

18 Q. Page 57 at line 2, do you see that I asked Mr. Forstall:

19 "Q. And who was the main proponent of using the macOS 10
20 as the basis for the operating system for the phone?"

21 And he says:

22 "A. I was."

23 Do you see that?

24 A. No. I'm not on your -- I'm not on your page. I'm sorry.
25 One moment.

1 Yes, I found it.

2 Q. Did he say that?

3 A. That's what it says.

4 Q. And do you have any reason to dispute that?

5 A. Yes.

6 Q. Do you believe Mr. Forstall was wrong in this response?

7 A. No. Again, Mr. -- he was just speaking --

8 Q. Sir --

9 A. -- overly generally.

10 Q. -- was he wrong? It's a yes-or-no question.

11 A. He was imprecise.

12 Q. Okay.

13 Now, in 2011, you took over the operating system software
14 outside of iOS; correct?

15 A. Yes, and some of the foundations of iOS.

16 Q. And at the time, your team delivered the shared components
17 between macOS and iOS; correct?

18 A. Correct.

19 Q. And that was more than half of the software that
20 underpinned iOS; correct?

21 A. Yes.

22 Q. And I think you testified already that both operating
23 systems shared the same kernel; correct?

24 A. Yes.

25 Q. Sir, do you recall a person who used to work under you by

1 the name of Mitch Adler?

2 **A.** Not well. The name is familiar, but I don't know him
3 well.

4 **Q.** Okay. Do you recall that Mr. Adler worked in the security
5 area and then left Apple around 2017 to work in the security
6 area for Google?

7 **A.** I might be thinking of a person who did. I'm not sure if
8 it was Mitch Adler.

9 **Q.** Do you know a person by the name of John Wright, who I
10 believe still works there?

11 **A.** The only John Wright that I can think of does not work at
12 Apple anymore.

13 **Q.** Okay. Then he left recently?

14 **A.** No. Quite a -- I mean, many years ago.

15 **Q.** Okay. And I know you know a person by the name of Dallas
16 DeAtley; correct?

17 **A.** I do.

18 **Q.** And he does still work at Apple?

19 **A.** He does.

20 **Q.** And he works on security; correct?

21 **A.** No. He works on compilers.

22 **Q.** Okay. He used to work on security; correct?

23 **A.** He did, correct.

24 **Q.** For many years?

25 **A.** Yes.

1 Q. And, for instance, when Apple first participated in Black
2 Hat in 2012, Apple sent Mr. DeAtley to speak at Black Hat;
3 correct?

4 A. I believe that's the right date, yes.

5 Q. And Mr. DeAtley was manager of the platform security team;
6 correct?

7 A. Yes.

8 THE COURT: Can you spell his last name for me?

9 MR. EVEN: De, D-E, Atley, A-T-L-E-Y.

10 THE COURT: Thank you.

11 BY MR. EVEN:

12 Q. And if Mr. Forstall told me that in 2007, Mr. Adler,
13 Mr. Wright, and Mr. DeAtley oversaw security on both iOS and
14 macOS, you have no reason to dispute that; correct?

15 A. I -- they ran different functions. So there was an iOS
16 security organization and a macOS security organization. So
17 he may have been speaking that collectively they owned it, but
18 they were two different teams at that time.

19 Q. I understand. Thank you for the clarification.

20 But jointly, they oversaw security on both sides of the
21 OS; correct?

22 A. Correct.

23 Q. Now, if you'd turn in your binder to the document marked
24 PX877. I believe it's in Binder No. 1, so it's the same one
25 you looked for Mr. Forstall's deposition earlier.

1 **A.** Okay.

2 **Q.** And do you see that it's a document or report entitled
3 "Third-Party Application on macOS 10 Embedded."

4 Do you see that?

5 **A.** I do.

6 **Q.** And I will represent to you this document, notwithstanding
7 what's on the cover, is from November 2007.

8 **A.** Okay.

9 **Q.** Now, you see on the cover that the document was prepared
10 by Mr. Adler, Mr. Wright, Mr. DeAtley, as well as some unnamed
11 others; correct?

12 **A.** Yes, it says that.

13 **Q.** And you understand that in this context, "macOS 10
14 embedded" refers to the iPhone operating system?

15 **A.** I believe it does.

16 **Q.** And if you turn to the second page, you see the first line
17 in the document states that Apple wants to, quote, allow third
18 parties to develop applications for the macOS 10 embedded
19 platform; correct?

20 **A.** The first line where? I'm looking at a page --

21 **Q.** 877.2.

22 **A.** -- that says, "We want to allow third parties to
23 develop...."

24 **Q.** "We want to allow third parties to develop applications
25 for the macOS 10 embedded platform."

1 Do you see that?

2 A. I do.

3 Q. And the "we" there is Apple; correct?

4 A. I believe so, or this group.

5 Q. And the document then contemplates, in the next couple of
6 lines, a transition from a closed system to an open model;
7 correct?

8 A. It says that.

9 Q. And given the timing, late 2007, do you understand this to
10 be a document from this security team discussing the opening
11 up of the iPhone to third-party applications?

12 A. I think it's anticipating how they might architect such a
13 system.

14 Q. Okay.

15 Now, the document then lays out two assumptions.

16 Do you see that under the heading "Assumptions"?

17 A. I do.

18 Q. And the first assumption is that "all code running the
19 device will be signed," and then they say, "We intend to sign
20 all applications that run on the device"; correct?

21 A. Yes.

22 Q. And you understand that by saying that "we intend to
23 sign," the model proposed here contemp- -- or the
24 architecture, as you call it, contemplates signing of every
25 application by Apple; correct?

1 **A.** Yes.

2 **Q.** Now, the paper goes on to explain that "By signing every
3 binary, we can uniquely identify running code. We will know
4 who created it and we will have the ability to revoke its
5 access to the system"; correct?

6 **A.** Yes.

7 **Q.** Now, the second assumption is that Apple, quote, will
8 execute running code within a sandbox; correct?

9 **A.** Yes.

10 **Q.** And I think you touched on that on your direct. The
11 purpose of an app being sandboxed is to restrict that app from
12 accessing files from other apps or from making changes to the
13 device itself; correct?

14 **A.** Yes.

15 **Q.** And it's also correct that sandboxing is an important
16 security feature because it restricts access to system
17 resources and user data to contain the image if an app becomes
18 compromised; correct?

19 **A.** Yes.

20 **Q.** So let's turn to the next section of the report that
21 speaks to goals.

22 And here, the paper lists that one of the goals is to
23 "encourage and foster development of applications by
24 individuals, third-party software vendors, and corporations";
25 correct?

1 **A.** Uh-huh. Yes.

2 **Q.** And that's still a goal of Apple's today; correct?

3 **A.** Yes.

4 **Q.** And that's a goal of Apple because Apple understands that
5 apps add value to the iPhone; correct?

6 **A.** Yes.

7 **Q.** Now, turn to the second goal, "Malware Redaction."
8 Do you see that?

9 **A.** I do.

10 **Q.** And the security team writes that "in order to prevent --
11 prevent and discourage the deployment of malware on the
12 platform, code signing would provide a basis for identifying
13 and revoking bad applications"; correct?

14 **A.** Yes.

15 **Q.** And they go on to say that, "Apple will reiterate on a
16 sandbox model to protect users from malicious code before it
17 has the chance to cause problems"; correct?

18 **A.** Yes.

19 **Q.** The document also says that "Apple may choose to restrict
20 access to specific system services or interfaces," and
21 specifically gives the example of selective access to Edge;
22 correct?

23 **A.** Yes.

24 **Q.** And that limited access thing, I think you've spoken a
25 little bit about it in your direct.

1 That's, essentially, the idea of entitlements; correct?

2 **A.** Yes.

3 **Q.** And the overall approach that we just discussed, signing
4 all codes, tight sandboxing, and system -- and a system of
5 limited entitlements, all of these are features of current iOS
6 architecture; correct?

7 **A.** Yes.

8 **Q.** So let's turn to the third page, which speaks to
9 distribution method.

10 Do you see that?

11 **A.** I do.

12 **Q.** In the first paragraph, the security team writes that
13 "Third-party applications can be distributed through iTunes,"
14 but then they write, "However, our model will allow for third
15 parties to distribute their own applications."

16 Do you see that?

17 **A.** Yes.

18 **Q.** And go down a couple of paragraphs, and you see that the
19 same team writes, "Signing does not imply a specific
20 distribution method, and it's left as a policy decision as to
21 whether Apple's signed applications are posted to the online
22 store or we allow developers to distribute on their own";
23 correct?

24 **A.** Yeah, though I believe it says that iTunes will be the
25 distribution mechanism, or the preferred one.

1 Q. Sir, did I read this correctly?

2 A. I think you skipped over a section. "We will distribute
3 third-party applications through the iTunes Music Store,"
4 which is the name that then became the App Store.

5 Q. Sorry, sir. We're not talking about the same paragraph.

6 A. Okay. Apologies.

7 Q. Go down to the third paragraph, and this is the portion
8 that I read and asked you to see. "Signing does not imply a
9 specific distribution method, and it's left as a policy
10 decision as to whether Apple's signed applications are posted
11 to the online store or we allow developers to distribute on
12 their own."

13 Are you with me now?

14 A. Yes. I see that. Thank you.

15 Q. And I read that correctly?

16 A. Yes.

17 Q. Now, if you turn to 877.6, which is marked Appendix C --

18 A. I'm sorry. Could you give me a second? 877. --

19 Q. It's the same document; it's just a couple of pages
20 forward.

21 A. Which page?

22 Q. 877.6. It says "Appendix C" at the top.

23 THE COURT: It's the same document.

24 THE WITNESS: Yes. I'm there. Thank you.

25

1 **BY MR. EVEN:**

2 **Q.** Thank you.

3 And you see that this says "Developer Scenarios" on it?

4 **A.** I do.

5 **Q.** And one scenario is "Guy In His Basement"; correct?

6 Sounds improbable, but that's what it says on the paper.

7 Sir, do you see that?

8 **A.** I do.

9 **Q.** And if you go to Point 3 in "Guy In His Basement," it
10 speaks to "once the developer decides that they have a final
11 version to deploy, they submit to Apple for signing, then they
12 get signed image and deploy as they wish"; correct?

13 **A.** That's what it says.

14 **Q.** And the same idea is also reflected in the next set of
15 bullet points, which is headed "EA."

16 Do you see that?

17 **A.** I do.

18 **Q.** And in "EA," they have, "Get signed image and deploy," and
19 there are several options, using a customs team, freeware, or
20 deal with Apple for DRN.

21 Do you see that?

22 **A.** I do.

23 **Q.** And "EA" is what?

24 **A.** I don't know. It may refer to Electronic Arts.

25 **Q.** That sounds like Electronic Arts; correct?

1 **A.** It may be.

2 **Q.** Okay. Electronic Arts is certainly an example of a big
3 developer, as opposed to the guy in his basement; correct?

4 **A.** Yes.

5 **Q.** And so the model contemplated in this white paper requires
6 Apple involvement in the form of signing, but separates that
7 signing by Apple from distribution; correct?

8 **A.** It has that option, envisions the possibility of that
9 option.

10 **Q.** And there is nothing in this document suggesting that this
11 security team recommends that distribution needs to be limited
12 to Apple's own App Store as a security issue; correct?

13 **A.** It -- it did say in an earlier page that signing would not
14 solve all malware problems.

15 **Q.** I agree.

16 But it doesn't say that the fact that they're opting for
17 signing and sandboxing and entitlement -- they don't say you
18 then need to distribute through Apple in order to make it
19 safe; correct?

20 **A.** I don't think -- I don't see that it draws a conclusion
21 one way or the other in that regard.

22 **Q.** Okay.

23 And nothing in this paper suggests that once an
24 application is signed, distribution through Apple would be
25 safer in any way than distribution through a different

1 channel; correct?

2 **A.** I haven't read this whole paper, so I can't represent what
3 it says.

4 **Q.** Well, certainly in the portions that we've read, you've
5 not seen anything like that; correct?

6 **A.** The -- in the very little bit of this document that I've
7 read, the one thing I did read is where it said that signing
8 alone would not block all malware, which seems to me --

9 **Q.** Sir, you need to answer my question.

10 My question is have you seen anything that suggests that
11 this team is saying that once an app is signed, distribution
12 through Apple would be safer in any way, shape, or form than
13 distribution through another channel?

14 **A.** You haven't pointed me to any lines that said that.

15 **Q.** Okay. Before we move on, if you can turn back to 877.3.

16 **A.** Okay.

17 **Q.** And here, the document speaks to development.

18 Do you see that?

19 **A.** I do.

20 **Q.** And it says in the second paragraph that, quote, The
21 crucial problem to solve is allowing developers to run their
22 code on their devices without having to get it signed by Apple
23 every time they compile.

24 Do you see that?

25 **A.** I do.

1 Q. And the document then discusses the process of
2 provisioning.

3 Do you see that?

4 A. Yes.

5 Q. And that is a process that would allow developers to test
6 their app on a limited number of preselected devices; correct?

7 A. Yes.

8 Q. And that, too, is a process that's been adopted and is
9 still used today for iOS; correct?

10 A. Correct.

11 Q. Turning to 877.4, "Revocation."

12 Do you see that?

13 A. I do.

14 Q. And the document talks about how, quote, The main goal of
15 signing all of the code that runs on a device is that it
16 allows Apple to revoke specific applications later.

17 Do you see that?

18 A. I do.

19 Q. And so what the team is saying here is that their model
20 contemplates allowing Apple to so-called shut off the spigot
21 if it turns out that an app is misbehaving; correct?

22 A. I didn't see it say "shut off the spigot." Is that your
23 phrasing?

24 Q. Those are my words. I'm just saying --

25 A. Oh, okay.

1 **Q.** -- that's the idea that's contemplated here, that Apple
2 can revoke --

3 **A.** Yeah.

4 **Q.** -- the signature and, essentially, stop the distribution
5 of an app if it goes bad; correct?

6 **A.** That is -- that is one capability that signing provides.

7 **Q.** Okay. So I want to shift gears for a second and talk a
8 little bit about macOS.

9 And if you can turn --

10 **THE COURT:** I'm sorry. I thought we were talking
11 about macOS.

12 **MR. EVEN:** No. This was iOS, Your Honor. This is
13 macOS embedded, which, as the witness, I believe, has
14 testified refers to the development of iOS. That's just the
15 early name of iOS.

16 **THE COURT:** Okay. Thank you.

17 **BY MR. EVEN:**

18 **Q.** And I don't want to misrepresent what you said, but I
19 believe you confirmed that that is how you understand the
20 document.

21 **A.** I think that's what they're referring to here.

22 **Q.** So now, please, let's talk about macOS.

23 **A.** Okay.

24 **Q.** And if you turn to DX5492, which is in your -- towards the
25 end of Binder No. 2, I believe.

1 **THE COURT:** Do you not want this one in evidence? Do
2 you not want 877 --

3 **MR. EVEN:** I believe 877 is already in evidence,
4 Your Honor. I believe it came in as part of the four hours,
5 Your Honor.

6 **THE COURT:** It is. Thank you.

7 **THE WITNESS:** I'm there.

8 **BY MR. EVEN:**

9 **Q.** Do you recognize DX5492 as the Apple Platform Security
10 white paper from 2020?

11 **A.** That's what it appears to be, yes.

12 **Q.** And the Apple Platform Security white paper is a document
13 that Apple releases annually to document security mechanisms
14 on Apple's various platforms; correct?

15 **A.** Correct.

16 **Q.** And it is your organization at Apple that releases this
17 document; correct?

18 **A.** We work in concert with marketing, but, yes, we
19 participate.

20 **Q.** And before the document is released, it's reviewed by you
21 and members of your team to ensure it is accurate and precise;
22 correct?

23 **A.** That's our attempt, yes.

24 **MR. EVEN:** Your Honor, I would like to move into
25 evidence DX5492 at this time.

1 **THE COURT:** No objection?

2 **MR. LO:** No objection.

3 **THE CLERK:** I'm sorry. 5429?

4 **THE COURT:** 5492.

5 **THE CLERK:** Okay. Thank you.

6 **THE COURT:** It's admitted.

7 **MR. EVEN:** Thank you.

8 (Defense Exhibit DX5492 received in evidence)

9 **BY MR. EVEN:**

10 **Q.** If you turn to page 1 of 3 of the document, so it's
11 5492.3.

12 And you see that this is the section that discusses app
13 security in macOS; correct?

14 **A.** You need to give me a second to turn the page, please.

15 **Q.** Sure.

16 **THE COURT:** You said 103?

17 **MR. EVEN:** 103.

18 **THE WITNESS:** Okay.

19 **BY MR. EVEN:**

20 **Q.** Are you there?

21 **A.** I am.

22 **Q.** Good.

23 And do you see that this discusses app security in macOS?

24 **A.** Yes.

25 **Q.** And do you see that under "Overview," the first thing it

1 says is, "App security on macOS consists of a number of
2 overlapping layers"; correct?

3 **A.** Yes.

4 **Q.** And the first layer it mentions is that the user has the
5 option to run only signed and trusted apps from the App Store;
6 correct?

7 **A.** Yes.

8 **Q.** And that option exists because even though macOS allows
9 distribution by third parties, macOS also features the macOS
10 store; correct?

11 **A.** Mac App Store, yes.

12 **Q.** And the Mac App Store is pre-installed on every single Mac
13 that is sold to a user; correct?

14 **A.** It is.

15 **Q.** And you understand, do you not, that if this Court were to
16 order Apple to open up iOS to third-party distribution, the
17 same option contemplated in this paper, to continue
18 downloading apps only from the App Store, would be available
19 to iPhone users; correct?

20 **A.** I -- I don't actually know what the Court could order and
21 what would be possible --

22 **Q.** Sir, that's not my question.

23 My question was if iOS were opened up such that there
24 would be third-party stores --

25 **A.** Right.

1 Q. -- that would not take out from the iPhone Apple's own App
2 Store; correct?

3 A. It could not. It might not, right.

4 Q. Sir, you understand that Epic has not sought to remove the
5 App Store from the iPhone; correct?

6 A. I actually don't know what remedy Epic is proposing.

7 Q. Okay. But you do understand that it is possible to open
8 up iOS without taking out Apple's own App Store; correct?

9 A. Right, yes.

10 Q. And if there is an App Store on the phone, a user can
11 decide to use only the App Store for all her apps; correct?

12 A. It depends what apps that user wants.

13 Q. Sir, the user can decide that she only goes to the Apple
14 App Store; correct?

15 A. If they're willing to be limited to what apps --

16 Q. Sir --

17 A. -- they use, then yes.

18 Q. Sir, she can go only to the App Store. That's what you
19 said about macOS in this paper; correct? That is the first
20 option you lay out, is a user can choose to only buy from the
21 Apple App Store; correct?

22 A. Correct.

23 Q. And for that user, the security level would not change;
24 correct?

25 A. No. I testified earlier as to why that is not correct.

1 Q. Sir, if a user chose to purchase only from the App Store,
2 the user would have the same protections that the user enjoys
3 today; correct?

4 A. No. The environment would change.

5 Q. Sir --

6 MR. EVEN: Your Honor, may I show Mr. Federighi his
7 deposition transcript at 87, line 7?

8 THE COURT: Yes. You can read from 7 to 14.

9 MR. EVEN: I'm sorry. This is -- I'm sorry,
10 Your Honor. I gave you the wrong -- I meant 17. 17 through
11 21.

12 MR. LO: Your Honor --

13 THE COURT: You may.

14 MR. EVEN: Thank you, Your Honor.

15 THE WITNESS: Sorry. Where?

16 BY MR. EVEN:

17 Q. Mr. Federighi, in your deposition, which is the big
18 spiral -- I know we have a lot of things moving -- page 87,
19 line 17.

20 A. One moment. Yes.

21 Q. And you see that I asked you, "If a user chose to
22 purchase from -- only from the App Store, the user would have
23 the same protections that the user enjoys today; correct?"

24 And you said, "Yes."

25 Do you see that?

1 **A.** Yeah.

2 **Q.** Now, I gather you also don't know that Epic has not asked
3 anything in this case that would remove app review from the
4 App Store; correct?

5 **A.** I could take your word for that.

6 **Q.** Okay. And I think you said on your direct that your
7 concern is that there are some apps that may not be available
8 and that may drive people to other stores.

9 **Is that the issue that you see there?**

10 **A.** That's one of them, yes.

11 **Q.** Now, the Mac App Store has far fewer apps than the iOS App
12 Store; correct?

13 **A.** Yes.

14 **Q.** By an order of magnitude; correct?

15 **A.** Yes.

16 **Q.** And nonetheless, in the Apple Platform Security white
17 paper that we just read and that you said you vet for
18 accuracy, that paper suggests that purchasing apps only on the
19 App Store is a viable option even on the Mac; correct?

20 **A.** It is a choice the user can make.

21 **Q.** It's the first choice that the user can make. That's what
22 the paper says; correct?

23 **A.** Well, it just says "first," but, yeah, sure.

24 **Q.** And you understand that on the iOS App Store, there are
25 currently 1.8 million apps or thereabouts; correct?

1 **A.** Yes.

2 **Q.** And yet you believe that people will need to go elsewhere
3 or have to go elsewhere because developers would leave the iOS
4 store; correct?

5 **A.** Some would.

6 **Q.** And that would mean that Apple was unable to compete for
7 the business of that developer; correct?

8 **A.** That would not necessarily be the reason.

9 **Q.** Well, if Apple could compete for the business of that
10 developer, that developer would sell either exclusively or
11 also through the iOS store; correct?

12 **A.** If you mean compete by lowering privacy protections and so
13 forth, then I'll take your -- your characterization. But,
14 certainly, it's compete in ways of lowering our standards for
15 protecting the user.

16 **Q.** What about compete on price?

17 **A.** That could be another factor.

18 **Q.** Okay. Sir, in the world as it is today, the iOS App Store
19 is the incumbent on iOS; correct?

20 **A.** Yes.

21 **Q.** In fact, it's the only store; correct?

22 **A.** Other than pirate app stores from Enterprise certificate
23 abuse.

24 **Q.** In China?

25 **A.** Predominantly.

1 Q. And in the world as it exists today, if we open up iOS
2 tomorrow, Apple would be able to offer developers a much
3 bigger audience than any third-party store could; correct?

4 A. It depends what you mean. I'm not sure that's true.

5 Q. I mean that there is going to be an App Store from Apple
6 on each and every phone; correct?

7 A. Sure.

8 Q. And there's not going to be an App Store from Epic, for
9 instance, or Steam on the phone pre-installed; correct?

10 A. There is a web browser installed. They could search for
11 any app they want that way. So --

12 Q. Sir, that's not what I asked.

13 There is not going to be a pre-installed Steam or Epic or
14 any other store, Adobe Store, on the iPhone; correct?

15 A. That statement is correct.

16 Q. And so other stores would have to compete to be
17 downloaded; correct?

18 A. Not with sideloading.

19 Q. Sir, other app stores, if they want to get on the iPhone,
20 would have to compete to be downloaded; correct?

21 A. If it's only the app stores, sure.

22 Q. Sir, I'm only asking about app stores.

23 My question is pretty simple --

24 A. I thought you were -- apologies.

25 Q. App stores, to get on the iPhone, would have to compete

1 and have the user somehow download them to the phone; correct?

2 **A.** I think so.

3 **Q.** And that's going to be true for every other store other
4 than the Apple App Store; correct?

5 **A.** Not if it was a web-based store.

6 **Q.** Sir, then they would need to get the user to somehow get
7 to them on the web; correct?

8 **A.** Oh, sure. But there is a web browser --

9 **Q.** They won't have --

10 **A.** -- built into the system --

11 **Q.** Sir, they will not have the same access that Apple has
12 because Apple will continue to pre-install its own App Store
13 on each and every phone; correct?

14 **A.** Apple will continue to pre-install, yes, I believe so.

15 **Q.** And you say and you believe that the App Store today has a
16 reputation for security and privacy and reliability; correct?

17 **A.** Yes.

18 **Q.** And all other iOS app stores or distributors who want to
19 distribute an app are going to start essentially from scratch
20 to build such a reputation; correct?

21 **A.** I don't know. It depends on who the incumbent is.

22 **Q.** Sir, they don't -- sorry.

23 Sir, the incumbent clearly right now is the Apple App
24 Store; correct?

25 **A.** With respect to iOS, but if they're --

1 Q. I'm only talking about iOS, sir.

2 On iOS, the Apple App Store is the incumbent; correct?

3 A. Yes.

4 Q. It has the audience; correct?

5 A. It does have the audience.

6 Q. It has the apps; correct?

7 A. Correct.

8 Q. And it has the reputation, you say?

9 A. I'd like to think so.

10 Q. And all the other app stores are going to start from
11 scratch to try and build on that; correct?

12 A. No. Steam has a reputation.

13 Q. Okay.

14 A. The Epic Store has a reputation independent of being on
15 iOS.

16 Q. Sir, they don't have any reputation on iOS right now;
17 correct?

18 A. Right. But that doesn't mean they're starting from
19 scratch.

20 Q. Okay.

21 Sir, you understand that at bottom, this is Apple's market
22 to lose; correct?

23 A. I -- I don't understand that characterization.

24 Q. Okay.

25 Going back to the Apple Platform Security paper, same

1 page, 103, it next says that "macOS layers protections to
2 ensure apps downloaded from the internet are free of known
3 malware."

4 Did I read that correctly?

5 A. Yes. That speak about known malware, correct.

6 Q. And "apps downloaded from the internet" here refers to
7 downloaded from places other than the App Store; correct?

8 A. Correct.

9 Q. And one security mechanism used to ensure this freedom
10 from malware is what you discussed that's known as
11 notarization or notary service; correct?

12 A. Yes.

13 Q. And notarization, the model there is that once the
14 developer has an app that is ready for release, she signs that
15 software with her Apple ID -- developer ID, sorry, and sends
16 it to Apple for notarization; correct?

17 A. Yes.

18 Q. And the notary service performs automated security checks
19 on the signed content; correct?

20 A. Yes.

21 Q. And when notarization is complete and successful, the
22 notary service can send back a ticket which the developer -- I
23 saw it referred to as staples to the binary and then can
24 distribute the binary in whichever way she wants; correct?

25 A. That's correct.

1 Q. And so in notarization, there's a separation between the
2 scanning and notarizing that Apple performs and the
3 distribution, which the developer can do in whichever way she
4 wants; correct?

5 A. Correct.

6 Q. And that's exactly what we saw that the paper from 2007
7 said would be possible in the model discussed there; correct?

8 A. It's in the ballpark. I don't think it's exact, but it's
9 in the ballpark.

10 Q. Okay.

11 Now, in terms of substantive protection, notarization
12 requires the developer to adopt something known as hardened
13 runtime; correct?

14 A. Yes.

15 Q. And hardened runtime is something that iOS apps are
16 already subject to today as the default, and it's not -- the
17 developer can't change that; correct?

18 A. That's correct.

19 Q. And as part of the notary service, Apple also scans the
20 application for known malware.

21 I think you've testified to that in your direct; correct?

22 A. Yes.

23 Q. Now, the scope and depth of the malware scans performed by
24 Apple during the notary service are determined by Apple;
25 correct?

1 **A.** Yes.

2 **Q.** And it is Apple's decision whether to limit those scans to
3 a static malware scan like we discussed in your direct;
4 correct?

5 **A.** There are technical and scalability limitations as well,
6 but we certainly have some flexibility into what we implement.

7 **Q.** Okay.

8 For example, there is nothing preventing Apple from
9 running dynamic analysis on the code as part of the notary
10 service; correct?

11 **A.** It's very challenging. You need to exercise the app like
12 a user would, which you couldn't do in an automated way. So
13 I'm not sure how that would work.

14 **Q.** Okay. So you would have some human to be involved in the
15 process? Is that what you mean?

16 **A.** I -- I don't know. If what you're describing -- right now
17 the notary service is not designed for humans to run the apps.

18 **Q.** Sir, that's not what I asked. I understand what the
19 notary service is right now.

20 What I'm asking is, is there any technical limitation that
21 prevents Apple from saying tomorrow, Now we're going to apply
22 dynamic analysis to every app that's sent to us for
23 notarization?

24 **A.** If we change the App Store to human app review, then we
25 could do those things, if that's what you're suggesting.

1 Q. And there is nothing preventing Apple from scanning the
2 app for use of private APIs; correct?

3 A. In practice, that's very difficult to do successfully.

4 Q. Sir, that is what Apple does on the iOS side today;
5 correct?

6 A. We try, but it's very hard to do successfully.

7 Q. I understand.

8 But the same attempt that's being done on the iOS side
9 could be applied as part of notarization; correct?

10 A. Sure.

11 Q. And that's just a question of Apple deciding to do it;
12 correct?

13 A. Correct.

14 Q. And there's nothing preventing Apple from using a tool
15 like PhotoDNA, for instance, to scan the app for things like,
16 you know, child pornography that are being scanned all over
17 the place in places where -- with user-generated content;
18 correct?

19 A. Incorrect.

20 Q. Okay. You don't know what PhotoDNA is?

21 A. I do.

22 Q. Do you know that sites with user-generated content use it
23 to ferret out especially child porn, since it's so sensitive
24 and illegal?

25 A. PhotoDNA is only able to scan for a relatively small

1 database of known past child pornography that fits specific --

2 **Q.** And that's what --

3 **A.** -- signatures --

4 **Q.** And that's what -- that's what sites such as YouTube and
5 TikTok and places like that use PhotoDNA for; correct?

6 **A.** They have other mechanisms, as well.

7 **Q.** I understand.

8 But you could use PhotoDNA and you could use the other
9 mechanisms they use, as well; correct?

10 **A.** I am not sure how the -- no. No, that would not work.

11 **Q.** Now, there is nothing that prevents Apple from having a
12 human review some or even all of the apps that are going into
13 the notary service; correct?

14 **A.** Yeah. You're now envisioning something that's nothing
15 like the notary service, but, yes, if we wanted to turn it
16 into app review, we could do so.

17 **Q.** And there is nothing that stops you from doing so;
18 correct?

19 **A.** Well, then it would be subject to policies that are not
20 currently enforced on the Mac --

21 **Q.** I understand. But you could do that tomorrow; right? You
22 already have app review. You know how to do it. You could
23 apply the same thing to notary; correct?

24 **A.** I don't think it's practical in scale.

25 **Q.** Well, the scale of app review is far larger than

1 notarization; correct?

2 **A.** Oh, yes. But if you start having the dynamic --

3 **Q.** Sir, that's correct? The scale in iOS is much larger;
4 correct?

5 **A.** That is correct.

6 **Q.** And so you could apply a process to notarization that even
7 could involve some sort of human review; correct?

8 **A.** Like I said, I think that would not be practical
9 because --

10 **Q.** Sir --

11 **A.** -- of scale. Can I explain myself?

12 **Q.** -- you could do that; correct?

13 **A.** Sorry. I'm trying to explain myself --

14 **Q.** It's a yes-or-no question, sir.

15 **A.** Okay.

16 **Q.** Either you could do it or you couldn't do it. If you're
17 telling me --

18 **A.** I believe we could not do it.

19 **THE REPORTER:** I'm sorry, I can't --

20 **THE COURT:** She is not going to be able to take down
21 both of you.

22 **MR. EVEN:** I'm sorry.

23 **THE COURT:** So the way this works -- and I don't have
24 a jury sitting here -- your attorney is going to get up and he
25 is going to ask you, "Did you want to explain?" You are going

1 to say yes. You are going to explain.

2 Stop arguing with him.

3 Let's move on. All right. Your question, Mr. Even.

4 **BY MR. EVEN:**

5 **Q.** Sir, you could even have a portion of notarization involve
6 some form of human review if you decided to change
7 notarization tomorrow; correct?

8 **A.** I have said it's incorrect.

9 **Q.** Okay. Now, Apple distributes through the App Store a host
10 of apps that allow users to generate content; correct?

11 **A.** You mean third-party apps?

12 **Q.** Yes.

13 **A.** Yes.

14 **Q.** Like TikTok or Instagram or Twitter; correct?

15 **A.** Yes.

16 **Q.** And Apple itself does not moderate the content on any of
17 these apps; correct?

18 **A.** Not directly, no.

19 **Q.** Instead, Apple distributes them through the App Store and
20 requires that they themselves do some moderation; correct?

21 **A.** That's correct.

22 **Q.** And in the case of -- the famous case of Parler, for
23 instance, Apple ultimately removed Parler from the iOS App
24 Store and Apple decided that Parler was not adequately
25 moderating the content; correct?

1 **A.** That's my understanding.

2 **Q.** Now, on Mac, third-party stores like Steam have apps that
3 are notarized; correct?

4 **A.** Yes.

5 **Q.** And there's nothing that prevents Apple from requiring
6 such stores to perform their own screening of apps for
7 malware, for age restrictions, for child pornography; correct?

8 **A.** I imagine we could have such a policy.

9 **Q.** And so Apple controls the notary service and, as you said,
10 can have policies that demand one thing or another and perform
11 whatever checks are viable.

12 But once Apple is done performing notarization and the app
13 is fully vetted and notarized, Apple sends it back to the
14 developer for distribution through whatever channel the
15 developer chooses; correct?

16 **A.** We send back a ticket that enables that, yes.

17 **Q.** Now, to complement notarization service, Apple employs on
18 macOS a mechanism known as Gatekeeper; correct?

19 **A.** Correct.

20 **Q.** And Gatekeeper ensures that by default, only trusted
21 software runs on a user's Mac; correct?

22 **A.** Trusted in the sense of does not contain known malware and
23 is from a registered developer, yes.

24 **Q.** Sir, if you look at DX5492.104.

25 **A.** I'm sorry. You are going to have to say that more slowly

1 if you want me to go there.

2 Q. It's the same white paper, the next page. We were on 103,
3 this is on 104, and under "Gatekeeper."

4 Do you see it says "Gatekeeper"?

5 A. Yes.

6 Q. And do you see it says, "macOS includes a technology
7 called Gatekeeper which ensures that by default, only trusted
8 software runs on a user's Mac."

9 Did I read that correctly?

10 A. You did.

11 Q. And trusted software is software that has been either
12 signed by the App Store or signed by a registered developer
13 and notarized by Apple; correct?

14 A. That's correct.

15 Q. And Gatekeeper also ensures users that all software in
16 macOS is checked for known malicious content the first time it
17 is opened, regardless of how it arrives on the Mac; correct?

18 A. That's correct.

19 Q. And that security check is implemented regardless of
20 whether the app is coming from the store or through
21 notarization; correct?

22 A. Yes.

23 Q. Now, Gatekeeper can also be set to allow only software
24 installed from the App Store; correct?

25 A. Correct.

1 Q. And so if a parent, for example, wants her child to only
2 be able to use software from the App Store, they can go and
3 set Gatekeeper to block even notarized software from that
4 child's computer; correct?

5 A. Yes.

6 Q. And that would take the child back to the first option
7 that we read about of being able to download only from Apple's
8 App Store; correct?

9 A. That's right.

10 Q. Now, Apple also runs something called XProtect in macOS;
11 correct?

12 A. Yes.

13 Q. And that's essentially an antivirus?

14 A. Yes.

15 Q. Now, Apple could implement notarization process in iOS;
16 correct?

17 A. It could.

18 Q. It is done through Xcode; correct? The binaries are
19 submitted through Xcode; correct?

20 A. That is part of the process, yes.

21 Q. And Xcode is used to develop for both iOS and macOS;
22 correct?

23 A. Yes.

24 Q. So that is not going to be a big change for developers;
25 correct?

1 **A.** That piece would not be, correct.

2 **Q.** In fact, you could implement all the mechanisms that are
3 currently in macOS on iOS; correct?

4 **A.** Technically, yes.

5 **Q.** Now, let's talk a little bit about your point on direct
6 about the user base for the Mac.

7 So Apple recorded record sales of its Mac line in 2020;
8 correct?

9 **A.** Yes.

10 **Q.** And Apple sold roughly 20 million Mac computers in 2020;
11 correct?

12 **A.** I'm not sure of the precise numbers.

13 **Q.** Do you recall that you sold 9 million just in the fourth
14 quarter?

15 **A.** No, I don't. I'm not familiar with those numbers.

16 **Q.** Okay. And you do recall that you told me in your
17 deposition that there are over a hundred million Mac users in
18 the world today?

19 **A.** Active Macs, right.

20 **Q.** And Apple tries to be truthful and transparent with its
21 Mac customers; correct?

22 **A.** Yes.

23 **Q.** And Apple publicly positions the Mac as a platform that
24 serves all different types of users, from families and
25 students to creative pros, businesspeople, and software

1 developers; correct?

2 **A.** That statement is correct.

3 **Q.** And Apple is aware, isn't it, that all these different
4 groups of people, its customers, use their Macs to store a lot
5 of information about their lives and that Macs have access to
6 sensors that are security sensitive; correct?

7 **A.** Yes.

8 **Q.** Because we do internet searches on Macs; correct?

9 **A.** Yes.

10 **Q.** And we do telemedicine calls on Macs; correct?

11 **A.** Could, yes.

12 **Q.** And for the last -- I lost count, but I guess the last 14
13 or 15 months, we have all sort of lived on our PCs, whether
14 they are Macs or another PC; correct?

15 **A.** Or iPads, sure.

16 **Q.** Okay. But a lot of us have lived on our PCs?

17 **A.** Yeah.

18 **Q.** Now, Apple also promotes its Macs as products for
19 learning; correct?

20 **A.** Yes.

21 **Q.** And it specifically markets its macOS products as products
22 appropriate for school children; right?

23 **A.** Yes.

24 **Q.** And, in fact, Apple has an entire web page on Apple.com
25 dedicated to marketing Macs and iPads side by side to school

1 children; correct?

2 **A.** Not directly to school children, but to --

3 **Q.** For use by school children?

4 **A.** Yes, correct.

5 **Q.** So if you turn to PX2882 in your binder.

6 **A.** Is that the first binder?

7 **Q.** Yes. It's in the first binder -- sorry. This is the
8 second binder. 2882 is the second binder.

9 **A.** 2882. Okay.

10 **Q.** You're there?

11 **A.** I am.

12 **Q.** And you see this is a download of the Apple website
13 specifically for K through 12 education, as shown on the top
14 left of the screen; correct?

15 **A.** Yes.

16 **Q.** And right on the first page, Apple is saying that for
17 students K through 12, iPad brings the freedom while Mac
18 brings the power; correct?

19 **A.** I think you kind of paraphrased there, but I think that's
20 kind of what it says.

21 **Q.** And then it goes on to explain that both iPads and Macs
22 use applications; correct?

23 **A.** Built-in apps, yeah, and intuitive software. Yep.

24 **Q.** And then if you turn to the next pages, there are a few
25 pages about iPads specifically; correct?

1 **A.** Yes.

2 **Q.** And then if you go to page 16 -- that's 2882.16 -- you see
3 there is now a section that's devoted to Mac; correct?

4 **A.** I see the start of a section.

5 **Q.** And do you see that it says that Mac has been empowering
6 the world's leading engineers, artists, etc., and it's been
7 doing the same for students, too; correct?

8 **A.** Yes, I do.

9 **Q.** And if you turn to page 18, there's a section about
10 professional apps for students; correct?

11 **A.** Yes.

12 **Q.** And those include Office and AutoCAD and Photoshop and
13 others; correct?

14 **A.** Yes.

15 **Q.** And for Mac, Photoshop and AutoCAD are not available on
16 the Mac App Store; correct?

17 **A.** I believe there is a version of Photoshop, a variant of
18 Photoshop, available on iPad.

19 **Q.** Sir, I'm asking on Mac.

20 **A.** Yeah.

21 **Q.** This is the Mac section; correct?

22 **A.** Oh, I'm sorry. I thought when you said App Store, you
23 meant on the Mac App Store.

24 **Q.** I think that's what I said. If not, I apologize --

25 **A.** I'm sorry.

1 Q. Photoshop is not available on the Mac App Store; correct?

2 A. I don't believe it is.

3 Q. It's available from the Adobe -- the Adobe website;
4 correct?

5 A. I believe that's true, yes.

6 Q. And nothing in this page suggests that getting software
7 directly from Adobe or from Autodesk in the case of AutoCAD is
8 unsafe; correct?

9 A. I don't see anything like that here, no.

10 Q. And Microsoft Office is available both from the App Store,
11 the Mac App Store, and from Microsoft directly; correct?

12 A. Yes.

13 Q. And nothing in this page suggests that students should go
14 to one or the other; correct?

15 A. Yeah. I don't think this is really a security document,
16 but, no, it does not.

17 Q. Sir, that's not what I asked.

18 Nothing in this page tells students that they should go to
19 the App Store because it's safer than going to Microsoft --

20 A. It does not say that here, no.

21 Q. In fact, the word "security" does not appear anywhere on
22 the web page for K through 12 school children except in
23 connection with iCloud. And I'm going to represent that to
24 you.

25 A. Okay.

1 Q. But you agree with me that nothing in this page suggests
2 that security is a vector that children or their parents or
3 their schools should consider when choosing between a Mac and
4 an iPad; correct?

5 A. Not on these pages, no.

6 Q. And you looked at -- sorry.

7 MR. EVEN: Your Honor, may I move DX2882 at this time
8 into evidence?

9 THE COURT: No objection?

10 MR. LO: No objection.

11 THE COURT: Admitted.

12 (Defense Exhibit DX2882 received in evidence)

13 BY MR. EVEN:

14 Q. Now, in your direct, you spoke about PX741.

15 Do you remember that?

16 A. I -- I'm sorry. I'm not --

17 Q. The Mac security --

18 A. -- keeping track of what document you're talking about
19 when you --

20 Q. The Mac security web page.

21 Do you remember that?

22 A. Oh, yes.

23 Q. And that's something I showed you in your deposition;
24 correct?

25 A. Correct.

1 Q. And that says that -- I'm sorry.

2 That document says that consumers can download safely from
3 the App Store and the internet; correct?

4 A. I think it says they can do -- if you want to read the
5 exact line? I don't have that.

6 Q. It says, "Download apps safely from the Mac App Store and
7 the internet" --

8 A. Okay.

9 Q. -- correct?

10 A. It says that.

11 Q. And it says, "Now apps from both the App Store and the
12 internet can be installed worry free"; correct?

13 A. It does say that, yes.

14 Q. And in that page, that is about security.

15 At no point does Apple tell consumers that if they are
16 seeking security, they should forego the Mac and buy an iPad;
17 correct?

18 A. It doesn't say that explicitly.

19 Q. It doesn't say that impliedly either; correct? It just
20 doesn't say that.

21 A. It talks about malware on the Mac.

22 Q. Sir, it doesn't suggest to anyone that they should go and
23 buy an iPad instead; correct?

24 A. Correct. That's what I tried to answer.

25 Q. And it doesn't suggest anywhere that Macs are intended

1 only for experts or pros or hobbyists or developers; correct?

2 **A.** It does not say that.

3 **Q.** And it doesn't have anything that says, If you are a
4 novice, stay away, go buy an iOS device; correct?

5 **A.** It does not say that.

6 **THE COURT:** 741 is not in evidence. Do you want it
7 in evidence?

8 **MR. EVEN:** Yes, Your Honor.

9 **THE COURT:** It's admitted.

10 **MR. EVEN:** Thank you.

11 (Plaintiff's Exhibit PX741 received in evidence).

12 **MR. EVEN:** Mr. Lo has entered it, but --

13 **THE COURT:** No, no, he had not.

14 And I'm assuming no objection?

15 **MR. LO:** No objections.

16 **BY MR. EVEN:**

17 **Q.** Now, we discussed briefly the idea of sandboxing.

18 Mac has a limited form of sandboxing for apps; correct?

19 **A.** Yes.

20 **Q.** And some apps on the macOS are not sandboxed at all;
21 correct?

22 **A.** Correct.

23 **Q.** And Apple today could not require full sandboxing on macOS
24 without breaking some software that users rely on; correct?

25 **A.** Yes, correct.

1 Q. Now, Apple considers apps that are not sandboxed to pose
2 greater threat to Mac users than apps that are sandboxed;
3 correct?

4 A. Yes.

5 Q. But Apple does not let users know whether an app they
6 download is or is not sandboxed; correct?

7 A. Correct.

8 Q. On iOS, by contrast, all third-party apps always have been
9 and still are sandboxed; correct?

10 A. Yes.

11 Q. And sandboxing has always been mandatory on iOS; correct?

12 A. Correct.

13 Q. And that's consistent with the Adler, Wright, DeAtley
14 paper we saw from 2007; correct?

15 A. It is.

16 Q. And because of that, the user -- sorry -- the developer
17 community on iOS, unlike on macOS, is used to implementing
18 complete sandboxing on all the apps that it writes; correct?

19 A. Yes.

20 Q. And if the Court were to order the opening of iOS
21 tomorrow, Apple could continue requiring complete sandboxing
22 in iOS; correct?

23 A. Yes.

24 Q. And sandboxing is important; correct?

25 A. Yes.

1 Q. Now, your -- your security white paper also talks about a
2 third option where users are free to operate within their
3 security model that makes sense for them, including running
4 completely unsigned and untrusted code; correct?

5 A. Yes.

6 Q. And having that option for consumers, for users, that's a
7 decision that Apple has made; correct?

8 A. Yes.

9 Q. And Apple certainly does not recommend to the average user
10 to install unsigned apps; correct?

11 A. Correct.

12 Q. And Apple has taken steps to make sure that a user will
13 not install unsigned code inadvertently or by mistake;
14 correct?

15 A. We try to make it difficult.

16 Q. For starters, we discussed that Gatekeeper, by default,
17 will not allow such installation; correct?

18 A. Correct.

19 Q. And to override this default, the user must undertake five
20 or six steps; correct?

21 A. There's a shortcut where you could do it in two.

22 Q. Well, you're going to get a warning first; correct?

23 A. Not in the shortcut path, no.

24 Q. Let's take a look at -- let's take a look at PDX005. You
25 can look at it on the screen.

1 **A.** Okay.

2 **Q.** And so, first of all, the user is going to get a warning
3 prompt that says that whatever the app is cannot be opened
4 because it is from an unidentified developer; correct?

5 **A.** This is one of the paths to opening. There is a different
6 one. I was referring to a shortcut.

7 **Q.** Okay. A shortcut is something that Apple instituted;
8 correct?

9 **A.** Yes.

10 **Q.** Okay. Through this path, you're going to have to go into
11 settings, change the setting, get three more warnings, and
12 then another warning when you try to actually open the app for
13 the first time; correct?

14 **A.** Uh-huh.

15 **Q.** Is that a yes?

16 **A.** I'm sorry. Yes.

17 **THE COURT:** Where --

18 **BY MR. EVEN:**

19 **Q.** And just a reminder, this is all on macOS; correct?

20 **A.** Yes, uh-huh.

21 **THE COURT:** Mr. Even, where is this document from?

22 **MR. EVEN:** This is PDX0005, and I believe it's in
23 our --

24 **THE COURT:** I understand it is -- I understand the
25 number. I'm -- there is no cover page. I'm asking where it

1 comes from.

2 **MR. EVEN:** It's just a printout from the web. It's a
3 demonstrative.

4 **THE COURT:** Okay. Thank you.

5 **MR. EVEN:** From Apple's own website.

6 **BY MR. EVEN:**

7 **Q.** You spoke a little bit about app review process in your
8 direct; correct?

9 **A.** Yes.

10 **Q.** And you suggested that app review is very important -- a
11 very important aspect of Apple's security approach; correct?

12 **A.** Yes.

13 **Q.** And I believe you told me that you, yourself, were never
14 on the ERB; correct?

15 **A.** Correct.

16 **Q.** And you're not involved on the day-to-day running of the
17 app review process; correct?

18 **A.** That's correct.

19 **Q.** You understand, however, that human review is resource
20 intensive; correct?

21 **A.** Yes.

22 **Q.** And it takes time; correct?

23 **A.** Yes.

24 **Q.** Do you know how much time a user spends on each app these
25 days?

1 **A.** No.

2 **Q.** And the user -- the developer -- sorry -- the reviewer, in
3 whatever time they have, they need to make sure that Apple's
4 IAP policies are enforced; correct?

5 **A.** I think among many other things, yes.

6 **Q.** And they need to enforce the anti-steering rules; correct?

7 **A.** I believe so, yes.

8 **Q.** And they need to enforce, according to you, privacy and a
9 host of other rules; correct?

10 **A.** Yes. Either upfront or after the fact, yes.

11 **Q.** I'm just talking about upfront right now. That's the big
12 wall that you put in your slide.

13 **A.** No, no. The wall works both ways.

14 **Q.** Okay. You believe that app review people go back and
15 check the 1.8 million --

16 **A.** No. I believe the wall includes centralized distribution
17 that allows us to correct problems after the fact.

18 **Q.** I see.

19 So -- and by "correct problems after the fact," you mean
20 revoke the app after something happened; correct?

21 **A.** Correct.

22 **Q.** And as we've seen in the paper by Mr. Adler, Wright and
23 DeAtley, that can be done even if there was no central
24 distribution; correct?

25 **A.** Not thoroughly enough, no.

1 Q. In their model, this could be done. That's what they
2 wrote; correct?

3 A. That is what they wrote.

4 Q. Thank you.

5 In any event, you came to this Court and you say that this
6 is a very important part of app review, but you don't know how
7 long a reviewer actually spends on each app; correct?

8 A. It's changed over time. I mean, I know it's been -- it's
9 varied over time, so I'm not sure what today's latest number
10 is.

11 Q. Do you know a ballpark?

12 A. It's minutes.

13 Q. How many minutes?

14 A. I don't know.

15 Q. Okay. Have you studied the error rate of app review?

16 A. In terms of aggregate numbers of apps approved and number
17 of issues discovered later, I've seen that in aggregate, yeah,
18 that it's a small fraction.

19 Q. You've seen an actual paper that says it's a small
20 fraction?

21 A. I've seen internal analysis that talks about number of
22 apps approved and number of, I think, times we've had to take
23 apps down or take corrective action.

24 Q. Sir, we better listen to Mr. Kosmyuka on that point,
25 correct, not you?

1 **A.** I'm sorry. What?

2 **Q.** We better listen to Mr. Kosmynka on that point, he'll know
3 better?

4 **A.** Oh, I think he would be an expert on that, yes.

5 **Q.** Okay.

6 If you turn to PX465 in your binder.

7 **THE COURT:** And do you not want 5 in evidence, or you
8 do?

9 **MR. EVEN:** No, I do not. It's a demonstrative,
10 Your Honor.

11 **THE WITNESS:** Okay.

12 **BY MR. EVEN:**

13 **Q.** And PX465 is an email chain between you and Mr. Phillip
14 Shoemaker dated August 28, 2013; correct?

15 **A.** Yes.

16 **MR. EVEN:** And, Your Honor, I would like to move
17 PX465 into evidence if it's not already in evidence.

18 **THE COURT:** It's not.

19 No objection?

20 **MR. LO:** No objection.

21 **THE COURT:** It's admitted.

22 (Plaintiff's Exhibit PX465 received in evidence)

23 **BY MR. EVEN:**

24 **Q.** And, sir, this email chain discusses an app that's passed
25 app review but then changed its behavior afterwards; correct?

1 **A.** I believe so.

2 **Q.** And in this case, the app was able to do this by receiving
3 server-side instructions to change behavior after it passed
4 the app review; correct?

5 **A.** Yes.

6 **Q.** And your view at the time was that any smart hacker could
7 implement this type of attack; correct?

8 **A.** Yes.

9 **Q.** And your conclusion was that there was nothing that app
10 review could do in advance to prevent this type of attacks;
11 correct?

12 **A.** Correct, not upfront.

13 **Q.** And instead, you believed that the more effective solution
14 is to monitor the malicious behavior in the wild, spot any
15 apps or SDKs that are misbehaving, and start blocking the apps
16 that use the misbehaving SDKs; correct?

17 **A.** Yes.

18 **Q.** And that all depends on Apple having the ability to
19 identify and trace this app back based on signing and, of
20 course, distribution; correct?

21 **A.** Yes.

22 **Q.** Sir, you're aware that -- and I think we discussed that
23 some -- that there are views within Apple that the Mac App
24 Store matters for distribution only of Apple's own apps and
25 those of developers that cannot create their own download

1 store; correct?

2 **A.** I could believe someone has said that.

3 **Q.** Okay. If you turn to PX2386.

4 **A.** Okay.

5 **Q.** Do you see this is an email in which Mr. Schiller actually
6 did say that; correct?

7 **A.** I don't know. Where would I be looking --

8 **Q.** In the top email, sir.

9 **A.** I see. Where in the email? The top line here?

10 I think he's questioning what it should be.

11 **Q.** Do you see that Mr. Schiller says, and I quote, "The Mac
12 App Store matters for distribution of Apple's software and
13 third parties that can create their own download store";
14 correct?

15 **A.** That's one of the sentences, yes.

16 **MR. EVEN:** Okay. Your Honor, I would like to move
17 PX2386 into evidence, please.

18 **THE COURT:** Any objection?

19 **MR. LO:** No.

20 **THE COURT:** It's admitted.

21 (Plaintiff's Exhibit PX2386 received in evidence)

22 **THE COURT:** Which of the pages were you reading from?

23 **MR. EVEN:** The very first page, second sentence,
24 Your Honor.

25 **THE COURT:** Thank you.

1 **BY MR. EVEN:**

2 **Q.** Sir, you mentioned streaming apps in your direct.

3 **A.** Yes.

4 **Q.** There are currently no native streaming apps on the App
5 Store; correct?

6 **A.** Not that I'm aware of.

7 **Q.** Okay. If you go to PX464.

8 **A.** Okay.

9 **Q.** And in this email -- first of all, this is an email from
10 August 22, 2017, between Mr. Stauffer and yourself; correct?

11 **A.** Yes.

12 **MR. EVEN:** Your Honor, I would like to move PX464
13 into evidence.

14 **THE COURT:** No objection?

15 **MR. LO:** No objection.

16 **THE COURT:** Admitted.

17 (Plaintiff's Exhibit PX464 received in evidence)

18 **BY MR. EVEN:**

19 **Q.** In this email, there is a discussion of a company called
20 LiquidSky that was a game-streaming service that believed that
21 their technology could support non-game-streaming apps;
22 correct?

23 **A.** Could support -- what did you just say?

24 **Q.** Non-game streamed apps.

25 **THE COURT:** Where are we?

1 **THE WITNESS:** Yeah.

2 **MR. EVEN:** This is on page 3.

3 **BY MR. EVEN:**

4 **Q.** We discussed this in your deposition.

5 **A.** Where are you directing my attention?

6 **THE COURT:** Was it in the big paragraph or where?

7 **BY MR. EVEN:**

8 **Q.** So if you turn to page 3, do you see the email that begins
9 with, "Craig, I would like approval to engage LiquidSky"?

10 **A.** I do.

11 **Q.** And do you see that the second paragraph begins with,
12 "LiquidSky is a cloud gaming service founded by Ian McLoughlin
13 in 2014"?

14 **A.** Yes.

15 **Q.** And if you jump three sentences to the end of the third
16 line, do you see it says, "While their focus has been gaming,
17 they claim their technology supports a wider range of
18 PC-in-the-Cloud use cases."

19 Do you see that?

20 **A.** Yes.

21 **Q.** Okay.

22 **THE COURT:** Mr. Even, I'm sorry. What's the point
23 here?

24 **MR. EVEN:** Your Honor, the document speaks to two
25 things: One, the availability or at least thought process of

1 people about non-game-streaming apps, and then there are other
2 portions of the email that are relevant because Mr. Federighi
3 explains why streaming apps are contrary to Apple's
4 business -- business incentives.

5 **THE COURT:** Okay.

6 **MR. EVEN:** But I am short on time.

7 **BY MR. EVEN:**

8 **Q.** Now, finally, sir, you mentioned something called
9 nutrition labels --

10 **A.** Yes.

11 **Q.** -- privacy nutrition labels; correct?

12 **A.** Yes.

13 **Q.** And that is something that Apple requires developers to
14 submit; correct?

15 **A.** That's correct.

16 **Q.** And Apple then publishes whatever the developer submitted;
17 correct?

18 **A.** That's correct.

19 **Q.** Apple does not verify the label in any way, shape, or
20 form; correct?

21 **A.** Well, we do some selective vetting, both of top apps and
22 of sort of random assortments of other apps. We have
23 different techniques to do --

24 **Q.** Sir, if you turn to PX1220.

25 **A.** Okay. Where -- 1220.

1 Q. Sir, do you recognize 1220 as a privacy nutrition label
2 from a Disney app?

3 A. I'm sorry. I'm having difficulty finding 1220.

4 THE COURT: It was the same book.

5 BY MR. EVEN:

6 Q. Same book, the first book.

7 A. Uh-huh.

8 THE COURT: You just have to go -- it's in the
9 middle. Numerical.

10 THE WITNESS: Apologies. I'm failing this particular
11 test. Mine seems to jump from 800 to --

12 BY MR. EVEN:

13 Q. That's okay, sir. Do you see PX0877? It's the next one
14 after that.

15 A. Okay. I'm there. I see the developer, Disney.

16 Q. Yes. And do you see the second sentence is, "This
17 information has not been verified by Apple."

18 Do you see that?

19 A. Yes.

20 MR. EVEN: No further questions at this time,
21 Your Honor.

22 THE COURT: Redirect?

23 I take it you don't want 1220 in, correct?

24 MR. EVEN: Actually, I would, Your Honor.

25 THE COURT: You do?

1 **MR. EVEN:** Yes.

2 **THE COURT:** All right. 1220 is admitted.

3 **MR. EVEN:** Thank you.

4 (Plaintiff's Exhibit PX1220 received in evidence)

5 **THE COURT:** You may proceed.

6 **MR. LO:** Thank you, Your Honor.

7 **REDIRECT EXAMINATION**

8 **BY MR. LO:**

9 **Q.** Mr. Federighi, you were asked about two of your deposition
10 testimony, and I want to go through those first.

11 In your deposition -- and I think counsel for Epic pointed
12 out -- you were asked whether you had knowledge about signed,
13 notarized apps that had malware.

14 Do you recall that exchange with counsel?

15 **A.** I do.

16 **Q.** And then there was an implication that in the Nokia --
17 that your citation to the Nokia report was inconsistent with
18 your deposition testimony.

19 So let me just ask, does the Nokia report -- well, what
20 does it mean to have -- for it to be a signed, notarized
21 application as you were asked in your deposition?

22 **A.** Yeah, I think -- excuse me -- during my deposition, there
23 was questions about whether we had statistics about malware on
24 the Mac, and then it was specifically narrowed to malware that
25 was -- not just gone through Gatekeeper, but that had also

1 been through the notarization process.

2 And in my deposition, I said that I believed that much of
3 it or most of it was because the Mac had shift requiring
4 notarization for -- for a couple of years.

5 And I was asked, Well, do you have a specific statistic
6 that says definitely that's what's happening? And I said,
7 Well, I have every reason to believe it is, but I do not have
8 a specific statistic.

9 Since then, as I testified earlier today, we -- we got
10 that exact data and verified that, in fact, there were -- most
11 of the malware we had to pull with MRT, over a hundred
12 instances, were malware that made it through the notarization
13 process. So I was able to subsequently get data to clarify
14 that point.

15 Q. You were also asked about your deposition testimony that
16 if a user chose -- in a world in which there are other iOS
17 distribution sources other than the App Store, that if a user
18 were to purchase from only the Apple App Store, the user would
19 have the same protections that the user enjoys today.

20 Do you recall that exchange with counsel?

21 A. I do.

22 Q. Even if the user has the same protections from Apple in
23 this alternate world, is it possible that the level of attacks
24 might be different?

25 A. Yeah, that's precisely my point. The technical

1 countermeasures, the protections, would still be in place, but
2 the level of attack, the kind of attack, the sophistication of
3 attack, would be greater. So the result for safety of the
4 user against malware would change.

5 **Q.** Okay. You were asked about the Enterprise Program and
6 certain abuses of the Enterprise Program, and there was a
7 series of questions about whether Apple conducted a -- I think
8 the words were "thorough enough check."

9 **Do you recall that?**

10 **A.** I do.

11 **Q.** Are there any challenges to Apple conducting a, quote,
12 thorough enough check with respect to enterprise applications?

13 **A.** Yeah. It's an inherently very difficult thing because, as
14 we discussed in the guidelines, this is a program that can
15 apply to businesses of a hundred or more people. There are
16 many, many businesses around -- of considerable global scale
17 around the world that can claim to be such a business, and it
18 is difficult to assess whether such a business is -- you know,
19 startups happen all the time. They hire employees. Is this a
20 legitimate business? Maybe it appears to be. Maybe it
21 literally was, and then that certificate turns into something
22 else.

23 **So even if we did a as thorough as possible evaluation**
24 **upfront, that doesn't mean that the certificate couldn't --**
25 **subsequently couldn't be abused as it transitions to another**

1 entity after that.

2 Q. Okay. And just to follow up on that last point, even if
3 Apple were to correctly confirm that the enterprise
4 certificate is issued to a real business, are there any things
5 that could happen after the granting of the certificate that
6 may result in it being abused?

7 A. Exactly. The business could -- that was granted the
8 certificate could, themselves, sell that certificate to
9 someone else who values it to be used to create a pirate app
10 store. The certificate could be secretly copied or stolen by
11 an employee. The business itself may go out of business and
12 someone else may pick up the pieces and take that certificate.
13 So many things can happen after the fact that could cause that
14 certificate to become abused.

15 Q. You were asked a series of questions about the threat
16 model for iOS, and the implication was that because you
17 weren't there at the inception of iOS, you wouldn't know.

18 So is the threat model, from a security perspective,
19 something that is only done once, or is that done more
20 frequently than the initial inception of the device?

21 A. Oh, it's something we're continuously evaluating and have
22 to deal with in the external environment.

23 Q. Okay. And you also mentioned that while you were not
24 present at the inception of the iPhone, you gained, I think
25 you said, retrospective knowledge.

1 Can you explain what you mean by that?

2 **A.** Oh, yeah. So I spent a great deal of time with people
3 like Dallas DeAtley, Jacques Vidrine, many people who were --
4 John Wright, and talked about the decisions we made, why we
5 made those decisions, how we wanted to evolve the architecture
6 going forward. And so through this, I gained a strong
7 appreciation for what we were trying to accomplish.

8 **Q.** You were shown the deposition testimony of Mr. Scott
9 Forstall, and you characterized his wording in that testimony
10 as being imprecise.

11 What did you mean by that? And I think this was about
12 using macOS 10 as a basis.

13 **A.** Yeah. So macOS, as we frame it externally to customers,
14 consists of a whole set of features, many of which we've
15 talked about today on the security point of view. But
16 everything -- if you said what's macOS, macOS has multiple
17 overlapping windows, macOS drives multiple displays, macOS has
18 a whole set of SDKs, including application SDKs like AppKit.

19 These were not the things that Scott Forstall or anyone on
20 that team were advocating were going to go over to iPhone. At
21 the time, the question was really do we use the Linux kernel
22 or do we use a macOS kernel or do we use something else.

23 And so this was about the kernel, Darwin really, not about
24 macOS, the larger system, as any of us would refer to it
25 either at that time or today.

1 Q. Okay. Would you turn to PX877. And this was the -- this
2 is the document that has on the title "Third-Party
3 Applications on macOS X," although it's spelled as "X" on the
4 paper, "Embedded."

5 A. PX877?

6 Q. Correct.

7 A. Okay. We've established my poor skill at locating
8 documents in these binders, but I'm going to take another
9 pass.

10 THE COURT: It should be in No. 1.

11 THE WITNESS: Say again?

12 THE COURT: The first volume.

13 THE WITNESS: Yes, thank you. I found it.

14 BY MR. LO:

15 Q. Let's start with the title.

16 It was represented, I think, by counsel that this is
17 actually a document from 2007, and let's take that to be
18 accurate for now.

19 Has anything changed in the world of threats facing iOS
20 devices since 2007 to today?

21 A. Well, absolutely. I mean, we've learned a tremendous
22 amount in the 14 years since this document was originally
23 created, both in terms about how security threats have
24 evolved, how the -- and what techniques are available, how
25 attackers are manipulating the environment, and we've also

1 seen how successful iOS has become and, therefore, what a
2 large target it's become.

3 Q. Okay. Let's turn to the second page of the document,
4 PX877.2.

5 A. Yes.

6 Q. And you were asked to look at the paragraph under the
7 "Assumptions" on that page.

8 Do you recall that?

9 A. Yes.

10 Q. And I want to go just one paragraph lower to that. And it
11 says that "code signing does not mean that we will solve all
12 of our security problems. However, it does make it
13 significantly harder to deploy on a wide scale malicious code
14 that will affect our customers or partners."

15 Do you see that, sir?

16 A. I do.

17 Q. Do you know what that is in reference to?

18 A. Yes.

19 MR. EVEN: Objection.

20 THE COURT: Overruled. He can testify as to his
21 understanding, especially given --

22 MR. EVEN: Okay.

23 THE COURT: -- the cross.

24 MR. EVEN: Thank you.

25 THE WITNESS: Yes. So it's describing that while

1 this is essentially one -- one technique that can help
2 increase difficulty, that this alone is -- is not sufficient
3 to ensure users are protected from malicious code.

4 **BY MR. LO:**

5 **Q.** And there was a back-and-forth exchange with counsel about
6 whether this document says that just because you have code
7 signing, it is required to have distribution through Apple.

8 Do you remember that exchange?

9 **A.** Yes.

10 **Q.** And I believe the ultimate agreement, if you'll call it
11 that, was the document was silent on this issue. So let me
12 just ask you the question.

13 Even with code signing, do you have a view as to whether
14 it would be safer and more secure to have apps distributed
15 solely by Apple?

16 **A.** Well, yes. I have a very strong view that centralized
17 distribution and app review are critical to the safety of our
18 users.

19 **Q.** Let's talk -- you were asked a series of questions about
20 macOS versus iOS. Sir, let's start with the basics.

21 Does Apple believe that relative to its peer products,
22 Macs are secure products?

23 **A.** Yeah. When considered among PC-class products, let's say
24 running Microsoft Windows, we believe Mac is the safest
25 choice.

1 Q. Okay. And there has been a lot of -- you were asked some
2 questions about the fact that the macOS has different and
3 perhaps lower security measures than iOS.

4 So how do you -- how does Apple reconcile its belief that
5 the Mac is a safe system when it's got lower levels of
6 protection or different levels of protections than iOS?

7 A. Well, I mean, I talked earlier about the analogy of if you
8 want to buy a car, you understand what's involved in a car.
9 There are certain freedoms and -- but you're driving on public
10 roads, and you better -- you better be reasonably well
11 trained.

12 Even in environments like K through 12 or education, often
13 in those environments, those systems are -- are well locked
14 down. Students aren't allowed to install applications in the
15 way that, of course, all iOS users would expect to do. And so
16 they have to be managed carefully in those environments.

17 Q. Okay. And you were asked earlier some questions about
18 whether Apple could put in human review and add additional
19 measures of defenses to the macOS side.

20 Do you recall that discussion?

21 A. I do.

22 Q. Are there any reasons why Apple has not done that?

23 A. The -- the expectation and scale around notarization is
24 very high. Part of what developers expect if they're
25 distributing themselves is they may want to put out a patch in

1 the middle of the night, and they found a bug and they want to
2 drive it through the system.

3 The notarization service on macOS does provide that
4 ability, because it's purely an automated scan, but the result
5 is the per-developer or per-app average submission rate to the
6 service is dramatically higher than the number of comparable
7 submissions to, say, the iOS App Store on a per-app basis,
8 because these developers are just driving these through at a
9 very high rate.

10 If you were to take the kind of human review process that
11 goes into the App Store and submit it to the kind of volume,
12 the multiplier, that we see on the notarization service, the
13 human cost would be tremendous and we wouldn't be able to
14 achieve the kinds of latencies that macOS developers, for
15 instance, expect from the notarization service.

16 **Q.** If -- if Apple were to institute human review in the
17 notarization service, does the fact that -- that developers
18 are allowed to distribute apps outside of the notarization
19 service impact the effectiveness of any such human review that
20 Apple might implement?

21 **A.** I'm sorry. I think I lost you about halfway through that.

22 **Q.** No problem.

23 You were asked -- we've been talking about the
24 hypothetical situation in which Apple instituted additional
25 human review --

1 **A.** Yes.

2 **Q.** -- in the notarization process.

3 And one of the things you testified about earlier was that
4 outside of notarization, there is another way for apps to get
5 their -- developers to get their apps to users.

6 **A.** Right.

7 **Q.** And so my question is does the existence of sort of these
8 other channels of distribution impact the effectiveness of any
9 such hypothetical human review?

10 **A.** Yes. Certainly, on the Mac, if notarization were to
11 become a -- a bigger barrier for developers, they would be
12 more incented to take other forms of attack, for instance,
13 coercing users into bypassing Gatekeeper altogether.

14 **Q.** Okay. On iOS --

15 **THE COURT:** How much longer do you have, Mr. Lo?

16 **MR. LO:** I've got maybe 10 minutes or so, 15.

17 **THE COURT:** Mr. Even, so far, do you have recross?

18 **MR. EVEN:** Maybe one question, Your Honor.

19 **THE COURT:** Pam, how are you doing?

20 **THE REPORTER:** I'm okay if that's true.

21 **THE COURT:** All right. Let's try to finish up.

22 **MR. LO:** Thank you.

23 **BY MR. LO:**

24 **Q.** In the iOS model, once an application has undergone the
25 app review process, are there limitations on the developer's

1 ability to add new code to the software?

2 **A.** Yes. The operating system doesn't allow them to create
3 new executable code, although they do have mechanisms with
4 scripting, for instance, downloading JavaScript or other data
5 that could alter app behavior.

6 **Q.** Okay. And then do those same policies apply on the macOS
7 side with respect to notarization and Gatekeeper technologies?

8 **A.** They certainly do, yes.

9 **Q.** Okay. If Apple were to institute just the Gatekeeper and
10 the notarization policies on the iOS, would that be an upgrade
11 or downgrade in terms of the level of security that are
12 offered to users?

13 **A.** I believe it would be a significant downgrade.

14 **Q.** Okay. Let me ask you to turn to PX2882. And this is the
15 one with the education note.

16 **A.** Yes.

17 **Q.** Okay. And I'll just direct your attention to the first
18 page of 2882, and I want to read about the descriptions in
19 which -- the manner in which Apple describes the iPad versus
20 the Mac.

21 The first sentence reads that "the power and flexibility
22 of iPad gives students the freedom to explore and express new
23 ideas whenever and wherever inspiration strikes."

24 Do you see that, sir?

25 **A.** I do.

1 Q. And then the next sentence says, "Mac has the power to
2 bring their biggest ideas to life."

3 Do you see that, sir?

4 A. Yes.

5 Q. Are these two statements -- recognizing that these are, in
6 part, marketing materials, are these statements consistent
7 with the way in which Apple markets the iPad versus the Mac?

8 A. I believe so, yes.

9 Q. Okay. And -- and with the reference to the Mac and the
10 power, what is the way in which Apple markets and positions
11 the Mac as a device to potential buyers and users?

12 A. The Mac has the ability to -- lots of flexibility on
13 hardware capabilities, multiple monitors, peripherals, lots of
14 software flexibility, installing sophisticated pro
15 applications, accessing lower-level operating system
16 capabilities like the terminal in the shell, automation, and
17 even writing code with tools like Xcode to do powerful things
18 like custom software development.

19 Q. And does -- do those sets of expectations by users require
20 certain tradeoffs in terms of control over the device and
21 perhaps security over the device?

22 A. Yeah, certainly many of the things Mac Pro Mac users do
23 who are really harnessing the power of macOS do have that
24 property.

25 Q. And then in terms of iOS and iPad, what is it that Apple

1 is trying to do in terms of that -- what is it that Apple --
2 how is it that Apple is trying to position those products, in
3 particular relative to, for example, Macs?

4 **A.** Well, certainly, we see iPad as a product that touches a
5 wider audience that can be, certainly, a child's first device,
6 often before they can even read, and certainly can be some --
7 some older people's first devices, as well, if they previously
8 found computers inaccessible to them.

9 At the same time, iPad provides tremendous flexibility and
10 all the richness of apps on the App Store to accomplish all
11 kinds of cool activities that take advantage of pencil and
12 touch. So it's a very versatile device in your life, very
13 portable.

14 **Q.** Okay. You were asked some questions about the app
15 privacy, and I think it was the nutrition labels?

16 **A.** Yes.

17 **Q.** Okay. And then there were some questions in terms of what
18 Apple actually does in terms of those nutrition labels.

19 Can you explain what it is that Apple does with those
20 nutrition labels in terms of review?

21 **A.** Yeah. So our core stance is that these labels are the
22 responsibility of developers to submit accurate information,
23 and if we receive reports or have indication that that
24 information is incorrect, that we will work with the developer
25 to make corrections to their labels. And we have certainly

1 done that.

2 And our basic text on the user interface explains to users
3 that this is fundamentally a representation from the
4 developer, not a representation from Apple.

5 However, we do some auditing to try to catch problems. We
6 don't change the label for a particular app to say Apple's
7 audited this one, but it's part of a process of finding
8 issues, whether it's from high-profile apps, apps that use
9 common high-volume SDKs and things like that.

10 Q. Okay. And then, sir, please turn to PX465.

11 A. Yes.

12 Q. Okay. And this is the -- about the dynamic analyzer.

13 Do you recall that, sir?

14 A. Yes.

15 Q. Okay. First, can you just explain the context of what's
16 being discussed here.

17 A. So this is about sort of Jekyll and Hyde apps; in other
18 words, an app that is submitted looking like it is benign,
19 that it doesn't have any bad behaviors, but then is --
20 modifies its behavior after the fact, perhaps with a trigger
21 from the developer on their server. So it's passed through
22 review and now it suddenly becomes doing something that app
23 review would have liked to have caught upfront.

24 Q. Okay. And did you understand this chain of emails to mean
25 that Apple has no ability to catch what you called this Jekyll

1 and Hyde behavior where behavior changes after the fact?

2 **A.** No, just that sophisticated attackers that -- could
3 bypass -- it's a bit of a cat and mouse game with attackers
4 around trying to catch these kinds of abuses.

5 **Q.** Okay.

6 And if Apple is able -- well, let me ask it this way.

7 What tools -- what tools does Apple have available to it
8 in terms of this type of behavior, either in deterring it or
9 stopping it?

10 **A.** The most important deterrent is that the developer knows
11 that if they do manage to do this, they won't be able to do it
12 for very long. It will -- the problem will get identified,
13 the app will be pulled down, and that the App Store human
14 review process will be updated to look -- be on the lookout
15 for copycats.

16 Our problem on the Mac is when we see one instance of this
17 and we block it at the code-signing level, the developer
18 simply slightly modifies the app and submits it again and
19 again and again through the notarization server. And without
20 human review, our malware scan can't spot it, and so the
21 developer is undeterred.

22 With the human review and centralized distribution, the
23 developer is unlikely to be able to do this over and over
24 again, and so they are disincented from even trying.

25 **MR. LO:** Thank you, Mr. Federighi.

1 Your Honor, I pass the witness.

2 **THE COURT:** Mr. Even.

3 **RECROSS-EXAMINATION**

4 **BY MR. EVEN:**

5 **Q.** Sir, at the end of app review as it is currently
6 constituted, Apple has a binary that is fully reviewed and
7 vetted; correct?

8 **A.** It's been through our review process, yes.

9 **Q.** And it's fully reviewed and vetted by Apple; correct?

10 **A.** What -- I don't know what "fully" means, but it is
11 reviewed according to our process, yes.

12 **Q.** And then whether to send it to the App Store or back to
13 the distributor is entirely Apple's choice; correct? That's a
14 yes-or-no question. It's entirely Apple's choice; correct?

15 **A.** Yes.

16 **MR. EVEN:** No further questions, Your Honor, other
17 than I'm being told that I may have missed 5492, and if so, I
18 would like to enter it into evidence.

19 **THE COURT:** No. I admitted 5492.

20 **MR. EVEN:** Thank you, Your Honor.

21 **THE COURT:** Anything on that one -- on those two
22 questions?

23 **MR. LO:** No, Your Honor.

24 **THE COURT:** Okay, sir. You're excused. You may step
25 down.

1 One thing that we should do before we finish off today.
2 And I did not get these into a written order, but we're down
3 to the short strokes.

4 So with respect to the two outstanding experts, first,
5 with respect to Dr. Rubin, paragraph 7, I understand the
6 objection is to the opinion that others will lack incentives.
7 That is sustained.

8 With respect to paragraph 82, the first sentence is
9 allowed. The balance of the paragraph is sustained and is
10 stricken.

11 With respect to 84, the first sentence, the objection is
12 sustained. The balance, it's overruled.

13 Then in response, Dr. Lee, the objections are overruled.

14 Okay. That's it for today. We will stand in recess until
15 8:00 a.m. tomorrow.

16 **MR. LO:** Thank you, Your Honor.

17 **MR. EVEN:** Thank you, Your Honor.

18 **THE COURT:** Thank you.

19 (Proceedings adjourned at 3:27 p.m.)
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CERTIFICATE OF REPORTERS

We, Diane E. Skillman, Pamela Batalo-Hebel, and Raynee Mercado certify that the foregoing is a correct transcript from the record of proceedings in the above-entitled matter. We further certify that we are neither counsel for, related to, nor employed by any of the parties to the action in which this hearing was taken, and further that we are not financially nor otherwise interested in the outcome of the action.

_____/S/DIANE E. SKILLMAN_____

Diane E. Skillman, CSR, RPR, FCRR

_____/S/ PAMELA BATALO-HEBEL_____

Pamela Batalo-Hebel, CSR, RMR, FCRR

_____/s/ Raynee Mercado_____

Raynee Mercado, CSR, RMR, FCRR

Wednesday, May 19, 2021